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POLYGALA ALBA, *NUTTALL.*

BY L. E. SAYRE, University of Kansas.

Some months ago through this journal I communicated a paper on Senega root. During subsequent months I noticed quite an extended discussion upon the subject of the market supply of this drug. I believe it is the opinion of many that a species of Polygala, yielding a very much smaller percentage of the acrid principle of the drug—*P. alba*—does not enter the market, and that this species is not found to any extent in the United States.

At a recent meeting of the Kansas Academy of Science, where there were present several prominent botanists and botanical collectors of the state, I took occasion to inquire whether the *Polygala alba* was found growing to any extent in Kansas. The reply was decidedly in the affirmative. Prof. A. S. Hitchcock, successor to Prof. W. A. Kellerman, having the chair of botany at the Agricultural College, Manhattan, said it was quite common in the western part of the state. Mr Bernard B. Smyth, Topeka, who has recently issued a *Check List* of the *Plants of Kansas*, said it was very abundant in Ellis, McPherson and Phillips counties. Prof. W. A. Harsh berger, of Washburn College, said it was found more or less abundant west of about the Sixth tier of counties in the state. In the recent check list of Kansas plants, by B. B. Smyth, I find the following species enumerated: P. alba, *Nutt.;* P. incarnata, *L.*; P. polygama, *Walt.;* P. sanguinea, *L.;* P. Senega, *L.*, and P. verticillata, *L.*

The Senega root, of which I wrote in my last communication, I have been unable to grow as I had hoped to do. But since Prof.

Maisch has so fully identified and classified it, the growing of the plant seems unnecessary for purposes of identification.

Note by the Editor.—One of the roots, apparently in good condition, which had been kindly furnished by Prof. Sayre, was planted, but likewise failed to grow.

THE EPIPHYTIC CHARACTER OF THE VANILLA PLANT.

Read at the Pharmaceutical Meeting of the Philadelphia College of Pharmacy, Oct. 18.

TO THE EDITOR OF THE AMERICAN JOURNAL OF PHARMACY:

DEAR SIR.—In the July issue of the "American Journal of Pharmacy" and afterward in "The American Druggist" there appeared an article by Mr. Geo. M. Beringer, Ph.G., entitled "Some Commercial Vanillas." In this article Mr. Beringer quotes from a circular letter issued by us in 1890 wherein we describe the vanilla plant as a parasite. He remarks this error is being repeated, and, singularly, by such an authority as the "Encyclopedia Britannica," and says, "while epiphyte in its character, clinging to forest trees for support, it is not parasitic, obtaining its support principally through its aërial roots, which drop to the ground, and in many of the cultivations of the islands of the Indian Ocean the plants are supported for a considerable length upon rude trellises."

We beg to differ with Mr. Beringer on this subject, and feel sure that he is in error and not the "Encyclopedia Britannica" or ourselves. When Mr. Beringer's article first appeared we received letters calling our attention to the discrepancy in our circular and Mr. Beringer's article, asking for fuller particulars in regard to the point at issue. Hesitating to reply at once, lest our former information and knowledge in regard to the plant might be at fault, we have gone to some trouble to prove the accuracy of our statement that the vanilla plant is a parasite, and to this point we have, therefore, correspondence from our friends in Mexico, Messrs. Montessoro and Scagno, of Getierres-Zamora, and Mr. L. S. Silvera, of Papantla, to verify our statement that the plant is a parasite. They state that they have often cut the vanilla plant five or six feet above the root, and that it lives from the sap of the tree after the root is cut for two or three years, but by that time its rootlets grow down to the ground again, the plant bearing flowers and fruit all the time. On the other hand, when the tree upon which the plant attaches

itself dies, the plant fails to propagate, and it will soon show decay. All attempts to grow the vanilla bean plant successfully in this country have been failures; while we have known a number of them to live for some time, none of them have ever been known to bear fruit.

My remarks refer particularly to the Mexican plant—Vanilla planifolia. Mr. Beringer's reference to the plants in the islands of the Indian Ocean might possibly be the case of some of the plants of the bastard species, but surely not of the plants growing the vanilla pod used as a condiment. While we admit that our knowledge of the vanilla from the islands of the Indian Ocean is not as full and as ripe as that of the Mexican, yet all information received on the subject warrants us in stating that the cultivated and wild plant bearing fruit in these countries take their sustenance and life from the sap of the forest trees.

We write this, believing that we are correct in saying that the vanilla plant—Vanilla planifolia—is a parasite, and substantiates the circular of 1890.

Yours very truly,

THE CHARLES E. HIRES COMPANY.

Philadelphia, October 5, 1892.

Note by the Editor.—On consulting the "Encyclopedia Britannica," 9th edit., xxiv, p. 66, we find that the vanilla plant is stated to have "a long fleshy stem and attaches itself by its aërial rootlets to trees, and appears to be little dependent on the soil for its nourishment." This description applies to an epiphytic plant, but *not to a parasite*. This is further shown from the account of the cultivation, according to which "in Mexico a clearing is made in the forest, where a few young trees, 12 or 15 feet apart, are left to serve as a *support for the climbing stems* of the vanilla plant." And further: "In Réunion, Mauritius and the Seychelles the young plants are *supported by a rude trellis* made between the trunks of the trees."

The account given in the correspondence quoted in the above letter likewise shows that the plant is epiphytic, and when cut above the ground derives its nourishment from the atmosphere, but not from the sap of the tree as erroneously stated. It is true that as late as the early part of the present century the vanilla plant was

commonly regarded, even by botanists, as being parasitic. But Mirbel showed that many plants, hitherto considered parasites, did not live upon the sap of other plants, but needed such plants merely for support, and such apparent parasites were called epiphytes. As early as 1830 Nees von Esenbeck and Ebermaier (*Handbuch*, I, p. 266) stated that the stem of the vanilla plant climbs upon high trees, fastening itself *upon the bark by means of aërial roots.* Substantially the same statement is made by Flückiger and Hanbury in *Pharmacographia*, page 657; also by Baillon (*Traité de botanique médicale*, page 1438), who carefully distinguishes the "racines adventives" of epiphytes from the "suçoirs" (haustoria) of parasites.

While in the cases cited the term "epiphyte" is not used, the description does not leave any doubt whatever as to the true character of the plant. In addition to these we quote from the works of several other botanists, who, like the above, have studied the plant under cultivation.

Bentley and Trimen, for whose "*Medicinal Plants*" plate 272 was drawn from a specimen in the Royal Gardens at Kew, where the plant flowers in May, state that "this singular plant is found in the hot, moist woods of several states of southeast Mexico, *climbing and epiphytic on forest trees.*"

Professor A. Tschirch recently devoted a year or two in different parts of the East Indies to the study of most of the important medicinal and economic plants of that region, and has published the results of his observations in a most interesting and instructive work, entitled "Indische Heil- und Nutzpflanzen und deren Cultur" (Berlin, 1892). The book contains photographic reproductions from Java and Ceylon of a vanilla plantation, and of single plants, showing their habit, of Vanilla planifolia under cultivation and run wild. In describing the culture of "this unpretentious epiphytic plant, for which neither elegance of growth nor of the flower can be claimed," Prof. Tschirch explains that "since the vanilla is a *climbing epiphyte, its caulomes need a support.* The nature of this support is entirely immaterial, for the vanilla plant, like ivy, does not produce haustoria penetrating into the supporting plant, but merely fastening organs (Haftorgane). . . . Since the vanilla plant does not enter into an organic union with its support, it *cannot take any nutriment from the bark of the latter*" (loc. cit., p. 122).

If further proof be desired, it will be found in the anatomical structure of these aërial roots as compared with the haustoria of parasitic plants. The covering (velamen radicum) of the aërial roots of epiphytic orchideæ, and of some aroideæ, more particularly of those inhabiting tropical forests, is very neatly described by Tschirch (*Angewandte Pflanzenanatomie*, I, p. 310); the velamen of the aërial roots of *Vanilla planifolia* consists of a single layer of tissue.

GYMNOCLADUS CANADENSIS.

By James H. Martin, Ph.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 116.

This tree is known in Canada and the Northern States as *chicot* or *stump tree*, and in Pennsylvania and southward as the *Kentucky coffee bean* and *Kentucky magnolia*. It grows in the north to Canada, south to Kentucky and west to Nebraska. In the Southern States it is most abundant and is usually found along the banks of lakes and streams. It reaches the height of 50 to 60 feet in the north, while in the south it is oftener found from 70 to 100 feet in height.

The bark of the trunk is thick and scaly, and the outer portion is readily removed. The wood, on account of its dense character, has been used considerably in the manufacture of furniture. It is of a rose color and admits of a high polish. The leaves when green are steeped in water and used as a fly poison. The roasted beans have been used as a substitute for coffee. In the immature state they appear to have some toxic properties, but become changed by the process of ripening and by roasting. The ripe beans are often roasted and eaten by children with impunity. There are one or two cases recorded where the immature green fruit has been eaten raw, and in each case producing nausea and vomiting. The pods when preserved like those of tamarind are said to be wholesome and slightly aperient. The physiological action of the beans has been described by Dr. Owens, as follows: "The immature bean collected in early autumn has been found to be a typical respiratory poison. It depresses reflex excitability by acting on the spinal centre. It paralyzes the centre of respiration by increasing pause after expiration. It lowers the blood pressure and decreases the pulse; and increases to a slight degree the nerve sensibility."

Various parts of the tree were submitted to proximate analysis. *The pulp* surrounding the beans was first examined, and found to contain 17·5 per cent. of moisture and 5·5 per cent. of ash. The greenish color disappeared with the wax removed by petroleum ether, with the resin removed by stronger ether, and with the sugar removed by alcohol.

The first two solvents removed nothing worthy of note, but the absolute alcohol extracted glucose, and a substance giving all the reactions of a glucoside. Water extracted 4·8 per cent. of mucilage, 7·4 per cent. of dextrin and organic acids, which were proven to be tartaric and citric, the former predominating.

The inner part of *the bean* was found to have a slight acrid taste, and to contain 10.00 per cent. of greenish-yellow fixed oil, having a specific gravity of 0·913, and easily saponified by the fixed alkalies. It was slightly soluble in absolute alcohol, and readily soluble in petroleum ether and ether. The presence of saponin was strongly indicated in the alcoholic extract.

The testa was found to contain 5·00 per cent. of fat and 1·7 per cent. of green wax, the latter having an acrid and nauseating taste. Gallic and tannic acids were shown to be absent.

The pod yielded to petroleum ether 3·8 per cent. of a greenish-yellow fat, to stronger ether 1·7 per cent. of a greenish substance soluble in acidulated water, and to absolute alcohol a brownish substance soluble in water.

The bark of the tree was exhausted with petroleum ether, which dissolved about 10·00 per cent. of a greenish fixed oil, having a specific gravity of 0·933, and easily saponified by the fixed alkalies, but sparingly by ammonia. It was found to be almost insoluble in absolute alcohol, but soluble in ether, chloroform, benzol and glacial acetic acid. No indications of alkaloid were obtained in any of the parts examined. Saponin appears to be the principle to which the physiological activity of the plant is due, and was found in all parts.

NOTE.—The seeds were examined by Samuel S. Mell, in 1887.[1] He found 10·00 per cent. of fixed oil, having a specific gravity of 0·919. He also found a little tannin and a glucoside. The tannin was not detected by Mr. Martin, although he noticed a principle

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[1] American Journal of Pharmacy, 1887, page 230.

which caused a darkening with ferric chloride, without responding to any other of the tannin tests. The glucoside noticed by Mr. Mell was probably saponin, since it was extracted from aqueous solution by chloroform. H. T.

THE VALUE OF EHRLICH'S URINE TEST FOR TYPHOID FEVER.

By George M. Beringer.

Read at the Pharmaceutical Meeting of the Philadelphia College of Pharmacy, Oct. 18.

The color produced by urine with a solution of sulphanilic acid has been claimed by Ehrlich as a means of detecting typhoid in its earlier stages, even before the appearance of the typical symptoms, *rash, etc.* Mr. Joseph W. England reported the following method of applying the test (American Journal of Pharmacy, 1891, page 611). A small quantity of a one per cent. solution of sodium nitrite is added to the urine and then a quantity of a saturated solution of sulphanilic acid in a five per cent. solution of hydrochloric acid, followed by the addition of ammonia. The test is stated to produce a urine color.

Dr. C. E. Simon, of the Johns Hopkins hospital, recommends the contact method and the following modification of the test: "Solution 1, a saturated solution of sulphanilic acid in 5 per cent. hydrochloric acid; solution 2, a 5 per cent. solution of sodium nitrite; 40 cc. of solution 1 is mixed with 1 cc. of solution 2, and an equal amount of urine is added and mixed. 1 cc. of ammonia is now carefully run down the side of the test tube; at the junction of the two liquids there will be observed a ring of the characteristic color varying from an eosine rose to a deep garnet red." This method of applying the test was followed by the writer in the experiments here recorded. Neither of these writers appear to question the reliability of the test.

The color produced in applying this test is undoubtedly due to changes in the composition of the amido benzene-sulphonic acid (sulphanilic acid), which is changed by nitrites or nitrous acid in the presence of alkalies to diazo-benzene-sulphonic acid, and this reacting with the peculiar principle present in the urine produces the color most likely due to an amine derivative. The reaction is analogous with that used in the estimation of nitrites in water.

The peculiar principle in typhoid urine producing the reaction still remains to be studied. Experiments showed that it could be extracted by ether from the urine strongly acidified with hydrochloric acid. The aqueous solution of the residue from the ether solution gave the characteristic reaction. But the urine rendered alkaline with sodium hydrate would not yield to ether any principle giving this reaction.

Having occasion to apply this test, I obtained typical reactions not only with known typhoid urine, but also in remittent fever and frequently where there were no febrile conditions at all.

This suggested a series of experiments to decide to what extent chemical products were likely to interfere in this reaction, especially those which from internal or external administration were apt to appear in the urine or were known to be normal or abnormal constituents.

In the experiments, one per cent. aqueous solutions of the chemicals were used where the solubility would permit, otherwise saturated solutions.

Neutral liquids, such as alcohol, methyl alcohol, acetone, aldehyde, paraldehyde, ether, chloroform and turpentine were found to have no effect. The mineral acids and their salts, and organic acids such as lactic, oxalic, acetic, tartaric and citric acid and salts, also gave no reaction.

Salicylates and benzoates gave an orange-colored reaction, the line having a distinct green tint.

The following alkaloids and neutral principles gave also no reaction: quinine, strychnine, cinchonine, cinchonidine, morphine, codeine, cocaine, atropine, caffeine, salicin, piperine, propylamine and phenacetine.

Upon adding a few drops of a 1 per cent. antipyrine solution to the mixed reagents, there is produced at once the well-known green coloration produced by this product with nitrites. The supernatant ammonia assumes a yellow color, separated sharply from the green solution by a brilliant red line.

Urea, uric acid, glucose and saccharose were all found to have no effect. Albumen gave an orange to a red line, depending on the amount present; 2 drops of a one per cent. solution gave a reddish orange reaction, and upon increasing the amount of albumen, it became a distinct red. While pepsin gave but a green line, the

addition of a very small quantity of peptone resulted in producing a distinctly pale red line.

The most minute quantities of phenol and creasote gave a dark red at once, and a single drop of a one per cent. phenol solution gave a reaction identical with that obtained from typhoid urine. Sulphocarbolates of sodium and zinc gave a pale eosine red line, gradually darkening.

Beta-naphthol gave a brilliant magenta color and resorcin a dark red brown at once. Thymol and eugenol likewise produced the red line. Gallic acid and pyrogallol produce a dark red, the entire layer of ammonia quickly assuming the same color. With tannic acid the reaction is peculiar. The mixed test solutions assuming an orange coloration and the ammonia becoming red, a green-colored line sharply marking the separation.

From the above, I am compelled to question the claims that have been put forth for the value of this test.

While the absence of the reaction may indicate the absence of typhoid, the presence of the reaction would not warrant the diagnosis of typhoid unless supported by other evidence, as many of the products producing the reaction, notably phenol and peptone, may be present in the urine from other causes.

EXTRACT OF BEEF AND PEPSIN.

By James T. Shinn.

Passing through Chicago last summer an opportunity was afforded for visiting the great packing establishment of Armour & Co., which is located among the famous stock yards of this metropolis of the West.

These stock yards by the way are worthy of a moment's notice. You take a train in the middle of the city and in half an hour arrive at the arched gateway inscribed: "Union Stock Yard, Chartered, 1865." Inside there are 400 acres of ground laid out with 20 miles of streets and water troughs, 200 acres of yards, 75 miles of drain and water pipes, and 50 miles of feeding troughs. There is capacity for the daily caring of 160,000 animals, cattle, sheep and hogs, and it is interesting to see the long rows of horses, with cowboy saddles on, tied along the sides of the streets ready to carry buyers and sellers to the different pens. About $5,000,000 are invested in the plant, and it requires 1,000 employés to handle the animals,

which in 1890 numbered nearly 14,000,000, including horses and calves. It is one of the curious sights of the place to see the cattle lured from the yards to the slaughtering pen by a white decoy steer, "Old Billy," who calmly walks ahead of the drove and deftly turns aside at the entrance gate, while the rest rush in to their fate. It takes less than ten minutes to convert the live steer into a carcass of beef ready for the cooling room, and nothing from the tip of his horns to the last hair of his tail, inside or out, is allowed to be wasted.

Armour's works occupy about 54 acres within the enclosure, where the slaughtering, curing, manufacturing and packing of the various products are carried on to an extent of seventy millions of dollars per annum.

The making of extract of beef and pepsin has been added to the other industries and is of special interest to pharmacists. Under the guidance of Mr. Manwaring and Mr. Walton we were shown through this department and saw such of the processes as were in operation.

For the *extract of beef* prime lean, well trimmed meat is finely cut up and digested with steam heat in huge wooden vats; the juice is expressed, filtered through muslin, and sucked into vacuum pans, each capable of reducing seventy-five cubic feet to the proper consistence in thirty-five minutes. The facilities for obtaining the best and freshest meat from the finest cattle are obvious, and the use of improved machinery insures the absence of all unpleasant burnt taste.

In the preparation of the various *pepsins*, they have the great advantage of an unlimited supply of *perfectly fresh* hogs' stomachs and can use from 10,000 to 14,000 daily. About two ounces are cut out of the whole stomach, the rest being rejected as inferior, the mucous membrane is scraped off and digested for six or eight hours in a dilute solution of muriatic acid, and by some peculiar process the *peptones* are eliminated, the solution clarified by settling at a very low temperature, and finally dried on glass plates. Saccharated pepsin is also made by Scheffer's process, and pepsins of various digestive power are put up for market.

With an experienced and capable chemist, who has unlimited material and capital to back him, there should be no reason why we should not be supplied with the very best products from an American laboratory.

MISTURA GLYCYRRHIZÆ COMPOSITA.

By Walter L. Stephen.

The following method of making mistura glycyrrhizæ comp. yields a preparation affording no sediment whatever, as proven by my experiments:

℞. Acaciæ pulv., ℥ ss.
Ext. glycyrrhizæ pulv., ℥ ss.
Sacchari pulv., ℥ ss.
Spts. æth. nit., f℥ ss.
Vin. antimonii, f℥ i
Tr. opii camph., f℥ ii
Aquæ dest., f℥ xii

Having mixed well the powders, add 6 fluid ounces of water gradually and rub to a paste. Place this in an evaporating dish and heat until perfectly fluid. Add the sweet spirit of nitre, wine of antimony and paregoric and enough water to make the required amount. The heat employed destroys molecular aggregation otherwise not effected and results in better and perfect diffusion of the solid substances, which gives a product devoid of sediment.

Philadelphia, October 26, 1892.

GLEANINGS FROM THE GERMAN JOURNALS.

By Frank X. Moerk, Ph.G.

Syrupus Granati corticis.—100 gm. of the finely powdered bark are boiled for one hour with dilute alcohol, sp. gr. 0·892, using a reflux condenser; after cooling, the drug is exhausted with dilute alcohol, and the percolate, after the addition of 60 gm. sugar, is evaporated on a water-bath to 100 gm. Alkaloidal assays of this preparation freshly made and after the expiration of two years gave almost identical results. The precipitate produced upon standing contained no alkaloid, but appeared to consist almost entirely of tannin. Owing to the deterioration of the dried bark and the stability of the syrup, it is suggested that the syrup be made in such places as abound in the production of the drug. The presence of 23 per cent. tannin in the bark imparts to the syrup an unpleasant, astringent taste; endeavors to manufacture a more palatable preparation led to the following formula: The powdered bark is digested with the necessary quantity of water for twelve hours in a water-bath; after cooling, 50 per cent. slaked lime is incorporated, allowed to

stand again for twelve hours, mixed with 4 or 5 volumes of alcohol, sp. gr. 0·830, strained and expressed The percolate is slightly acidified with dilute sulphuric acid, filtered and distilled; there remains an almost pure solution of the alkaloidal sulphates, in which the alkaloids are determined, and the preparation is finished by adding sugar and a small quantity of the syrup according to the first formula, through which sufficient tannin is introduced to form the more reliable tannate of the alkaloids. Of a syrup containing one per cent. of the alkaloidal sulphates, thirty grams constitutes a dose, best administered in an emulsion of thirty gm. castor oil. The alkaloids are determined as follows: The solution of the sulphates, freed from alcohol, is mixed with a slight excess of milk of lime; after an hour 300 cc. petroleum ether (boiling point 45° C.) are thoroughly agitated with the mixture, allowed to stand and the petroleum ether removed as completely as possible, mixed with 50 cc. $\frac{n}{10}$ sulphuric acid, the solvent recovered by distillation, used again in the extraction of alkaloid, etc., until the alkaloids have been completely extracted; after the removal of the solvent the excess of acid is titrated with $\frac{n}{10}$ potassium hydrate. Each cc. of the $\frac{n}{10}$ sulphuric acid neutralized by the alkaloids corresponds to 0·02 gm. alkaloidal sulphate. The alkaloids in the syrup can only be estimated after precipitating the sugar with an excess of alcohol.—E. Aweng, *Journ d. Pharm. Els-Lothr.*, 1892, 209.

Test for oil of sesame.—Baudouin's test with sugar and hydrochloric acid is best carried out by using the following proportions: 0·1–0·2 gm. sugar are dissolved in 20 cc. hydrochloric acid (specific gravity 1·18), 10 cc. of the oil added and the mixture well shaken; no matter whence the source of the sesame oil the acid layer immediately upon separation shows a permanent deep wine-red coloration. In the test it is essential that the hydrochloric acid be of the prescribed strength, as a weaker acid will not give the test. Olive, cotton-seed and arachis oils cause no red coloration, but impart to the acid after a time a dirty yellowish-brown color; mixtures of sesame and olive impart a red color, the intensity of which is proportionate to the quantity of the former oil; 10 per cent. sesame oil still causes a pure dark-rose color. Of the several commercial olive oils only the Bari-oil, as announced by Villavecchia and Fabris, by the above test simulates the behavior of sesame oil, but there are such points of difference that it is possible to distinguish

between the two. Bari-oil with the test gives a red coloration equal in intensity to olive oil containing 10 per cent. sesame oil, but this coloration never appears immediately after the separation, but always requires several minutes for its development; again, the color always shows a bluish-violet shade. Of interest is also an observation made with an old, strongly rancid sesame oil, this gave an indigo blue instead of a wine-red coloration.—Dr. G. Ambühl. *Schwz. Wochenschr. f. Chem. u. Pharm.*, 1892, 381.

Syrup of Glycyrrhiza made from the root must vary in quality as the root contains more or less of glycyrrhizin. Dr. O. Linde proposes to first isolate the acid ammonium glycyrrhizin and use this in the preparation of the syrup. The cut root is extracted with cold water, the liquid boiled, filtered, concentrated, precipitated with an excess of dilute sulphuric acid, the precipitate washed, dissolved in the least possible quantity of ammonia water and the solution evaporated upon plates at a moderate temperature. Prepared by this method the ammoniated glycyrrhizin will conform to the following tests: (1) Heated with solution of potassium hydrate it evolves ammonia. (2) 0·1 gm. must be completely soluble in 10 gm. cold water, forming a clear, pale-brown solution having a faint acid reaction. (3) This solution with 3 gm. dilute acetic acid yields a precipitate, coagulating by stirring, and an almost colorless filtrate which should be free from mineral acids. (4) 1 gm. dissolved in 2 cc. water of ammonia and 4 cc. alcohol with 15 cc. absolute alcohol forms a very turbid mixture. (5) 0·1 gm. must dissolve in 3 gm. glacial acetic acid with pale-brown color, the addition of 20 cc. water causes a coagulable precipitate, whilst the filtrate is almost colorless.

If the above extraction be made with a dilute ammonia water a better yield, although of inferior quality, can be obtained, the ammonia extracting bitter and resinous principles which afterwards are removed with great difficulty.

To make the syrup 4 parts ammoniated glycyrrhizin are dissolved in a mixture of 4 parts alcohol and 26 parts water and added to 166 parts simple syrup.—*Pharm. Centralhalle*, 1892, 531.

Stability of Volumetric Solutions.—Potassium permanganate solution. A solution (1 : 1,000) exposed to diffused daylight was found to have suffered no decomposition in the course of a year; at the end of eighteen months' exposure a loss of 2·61 per cent. was

observed. The solution kept in black bottles lost in eighteen months only 0·94 per cent. The solution (3 : 1,000) was found to possess still greater stability; kept in black bottles or exposed in colorless bottles to diffused daylight no change in the strength could be detected after eighteen months.

Sodium thiosulphate solution.—The $\frac{1}{10}$ normal solution at the end of six months was found unchanged when kept in black bottles or exposed to diffused daylight; it seems, however, that the former is the more permanent method of keeping, since in the solution in colorless glass a mould growth developed at the end of four months.

Oxalic acid solution.—The $\frac{1}{10}$ normal solution protected from light and dust was not altered in the course of five months; at the end of a year a loss of 2·85 per cent. was noticed.—Dr. Bruno Grützner, *Archiv der Pharm.*, 1892, 321.

Assay of crude carbolic acid.—Into a large beaker glass are weighed 100·0 each of the carbolic acid and of milk of lime (made by slaking one part lime with five parts water), the vessel placed in a steam-bath and heated for one hour with frequent stirring; an equal volume of water is then added and the mixture thoroughly stirred. The tarry and resinous constituents by this treatment form insoluble calcium combinations, while the phenol and cresol enter solution and the volatile substances are dissipated. After cooling the mixture is filtered, the residue washed with water and the filtrate decomposed by the cautious addition of hydrochloric acid; to easily separate the phenol and cresol the aqueous solution is saturated with salt, this causing the phenols to float upon the brine; after removing the phenols they are weighed without further purification. The commercial designation of crude carbolic acid is based upon the solubility in soda solution, an acid being called 100 per cent. if it dissolve clear in the soda solution. Treated by the above process, commercial crude carbolic acid of 25–30 per cent. assayed 2–3 per cent.; 40–60 per cent. assayed 3–5 per cent.; 80 per cent. assayed 50 per cent., and specimens marked 90–100 per cent. assayed 80 per cent. of phenol.—F. Seiler. *Schwz. Wochenschr. f. Chem. u. Pharm.*, 1892, 365.

Mercuric oxide.—To determine the influence of temperature in the preparation of precipitated mercuric oxide C. Guldensteeden Egel-

ing made a number of experiments: (1) Cold mercuric chloride solution (1 : 20) added to a cold, dilute potassium hydrate solution gave an oxide, which dried, first between filtering paper, later in a desiccator, with oxalic acid solution (1 : 10) changed at once into the white mercuric oxalate. (2) The solutions of the same strength but boiling hot gave an oxide which required some time to react with oxalic acid solution. (3) As in 2, but the boiling continued for some time (replacing the evaporated water), a portion of the oxide being filtered out at intervals of one-half hour; the color of all the precipitates was pure yellow, but toward oxalic acid solutions they showed differences, the longer the boiling was continued the less were the precipitates affected by oxalic acid. It is therefore not possible to change the yellow oxide into the red by boiling. (4) Repeating the experiments of Bosetti (Am. Journ. Pharm., 1890, 446), but using potassium hydrate instead of barium hydrate, it was possible to prepare an oxide which in physical and chemical properties was not to be distinguished from the red oxide obtained by igniting mercuric nitrate; the details are as follows: Into a boiling mercuric chloride solution (1 : 5) boiling concentrated potassium hydrate solution was dropped until the dark-brown color of the oxychloride was changed to a bright red and the liquid reacted faintly alkaline; the mixture was then poured into about twenty times its volume of boiling water, the precipitate collected, washed and dried.—(*Ber. d. Niederl. Pharm. Ges.*) *Pharm. Ztg.*, 1892, 517.

Assay of Iodoform-gauze, etc.—If the material contain 5–10 per cent. iodoform, 4 grams are taken for the assay, if it contain more a smaller quantity suffices; the material is placed in a 100 cc. flask. 60 cc. alcohol added and boiled, using an inverted condenser, until the iodoform is dissolved. After cooling alcohol is added to fill up to the 100 cc. mark; of this solution a quantity is taken which represents from 200–300 milligrams of iodoform, placed in a flask connected with an inverted condenser, and boiled with a solution of 5 gm. potassium hydrate in 5 cc. water for one-half hour, or until some of the alcohol distilled over is odorless or gives no turbidity upon the addition of water; the solution is then evaporated to dryness, dissolved in water, acidified with nitric acid and the iodine determined with silver nitrate. In making the calculation allowance must be made for the space occupied by the material, thus if 4 gm. of a 10

per cent. gauze were used, the gauze occupied a volume of 3·6 cc., hence instead of having 100 cc. of the alcoholic solution there are only 96·4 cc.—G. H. Boldingh (*Ber. der Niederl. Pharm. Ges.*) *Pharm. Ztg.*, 1892, 517.

Ipecacuanha root.—The proportions of bark and woody portion in the three commercial varieties were found as follows:

	Bark. Per Cent.	Wood. Per Cent.
Rio best commercial root,	77	23
Rio inferior commercial root,	65·5	34·5
Carthagena commercial root,	84	16
Carthagena select root,	91·5	8·5
Singapore commercial root,	91	9

Rio ipecacuanha was found to yield 0·53–1·45 per cent. emetine, depending upon the quality of the root; Carthagena ipecacuanha from 0·9–1·85 per cent., the woody portion yielded 0·23 per cent. emetine; Singapore ipecacuanha gave 0·54 per cent. emetine. These assays were made by Kremel's method (see Am. Journ. Pharm., 1892, 519).—Caesar & Loretz, *Apotheker Ztg.*, 1892, 464.

Kola-nut and cacao-nut constituents.—The investigations of Dr. E. Knebel (*Am. Journ. Pharm.*, 1892, 190), disclosing the fact that the kola-nut contained a glucoside which by decomposition gave rise to caffeine, glucose and kola-red, and rendering it very probable that fresh kola-nuts contained no caffeine, but only glucoside, has been verified by A. Hilger, who recently obtained fresh kola-nuts so as to perform the necessary analysis. Of other drugs yielding caffeine and theobromine a specimen of cacao-nut preserved in alcohol was examined, with results similar to those obtained from the kola-nut. There is present a glucoside which is decomposable by a diastatic ferment, also present in the fruit, into dextrose, cacao-red and a mixture of caffeine and theobromine; boiling water and warm dilute acids also bring about decomposition. The fresh fruit was found to be free from cacao-red, caffeine and theobromine. To isolate the glucoside from the commercial cacao-nut, the fat is removed by use of petroleum ether, the theobromine and dextrose by use of cold water, and then the glucoside extracted with alcohol; the solvent is carefully evaporated, leaving the glucoside, which is purified by repeated solution in very dilute potassium hydrate solution and

precipitation with dilute hydrochloric acid.—*Apotheker Ztg.*, 1892, 469.

Gelatinized infusion of digitalis.—Mention has been made in the *Am. Journ. of Pharm.*, 1892, 406 and 458, that the gelatinizing of the infusion is due to the action of a minute organism, *Micrococcus gelatinogenus*, upon cane sugar; in a recent paper upon the products of the alteration of cane sugar Dr. W. Braeutigam announces that there are produced dextran, dextrose and lævulose. The last is used as food by the organism, while to the formation of the first is due the gelatinizing. Dextran may be separated from the other products by precipitation with alcohol; it forms snow-white flakes, on a water-bath drying to a greenish-white, amorphous, horny mass, soluble in water. The aqueous solution with Fehling's solution gave a pale blue, slimy precipitate, without reducing the solution; precipitated with subacetate but not with acetate of lead; by heating with dilute acids dextrose was produced quantitatively. The solution has an insipid taste, and is strongly dextrogyre.—*Pharm. Centralhalle*, 1892, 534.

ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

Oil of geranium in oil of rose.—Dr. Panajotow (*Bulletin de la Société chim.*, May 20, 1892) gives the following tests for the detection of oil of geranium in oil of rose. (1) To 2 cc. of bisulphite of rosaniline, obtained by decolorizing fuchsine with sulphurous acid, are added two or three drops of the oil. If the oil is pure it slowly (within twenty-four hours) assumes a red color; should it, however, contain oil of geranium it is rapidly (in about two hours) colored blue; (2) Concentrated sulphuric acid yields with oil of geranium a brown mass which is not entirely dissolved by 95 per cent. alcohol, the solution being red and the flocculent particles yellow. Oil of rose treated in like manner yields a mass which is entirely soluble in alcohol, the solution being colorless.

Oil of santalwood.—E. Mesnard ascertained (*Jour. de Phar. et de Chim.*, August 15, 1892) that pure oil of santalwood, on being mixed with sulphuric acid, yields a viscous liquid, which becomes pasty and rapidly solidifies, the mass being of a light grayish-blue color and adhering firmly to the glass. If, however, adulterated

with oil of cedar, copaiba, cubeb or turpentine, the resinous mass produced does not completely solidify, and retains always a dark tint of a very distinct shade.

Crystallized ox gall of Flatner.—This is prepared (*Journ. de Pharm. d'Anvers; L'Union pharm.*, 1892, 382) by mixing the ox gall with charcoal and carefully evaporating to dryness. The residue is then treated with absolute alcohol, filtered, and to the filtrate ether is gradually added so as to form a perfect mixture. Crystals form gradually, which are separated and dried over sulphuric acid. The crystals are white, inodorous, of a slightly bitter taste and are very soluble in alcohol and water and insoluble in ether. The product consists of a mixture of glycholate and taurocholate of sodium.

Ambergris.—G. Pouchet (*Rép. de Phar.*, August, 1892) observed that different samples of ambergris, though differing in appearance, have a close resemblance in odor and composition. The drug consists of acicular crystals with a considerable proportion of blackish pigment and a certain quantity of excremental matters characterized by the presence of beaks of cephalopodes.

The microscopical and chemical examination of this product has led S. Jourdain (*Jour. de Phar. et de Chim.*, Aug. 25, 1892) to regard it as analogous to intestinal calculi, but what particularly attracted his attention was the presence of a large number of the jaws of cephalopodes, either entire or in fragments. Some of these animals exhale a strong odor, which does not disappear after death or on drying. This peculiar perfume, modified by the biliary products of the sperm whale, constitutes the odor of ambergris. The black coloring matter of the latter is likewise due to cephalopodes, which contain it in considerable quantities.

Preparation of salol.—According to Ernst (*Rép. de Phar.*, August, 1892) nearly the theoretical quantity of salol is obtained by heating salicylic acid to between 160° and 240° C., and preventing access of air, while water is being disengaged. Salicylic anhydride is probably formed during the operation, and by its decomposition phenol is produced, which combines with unaltered salicylic acid to form salol.

Phenosalyl.—Prepared according to Dr. de Christmas (*Médecine moderne*, June 30, '92) phenosalyl is a mixture consisting of phenol 9 gm., salicylic acid 1 gm., lactic acid 2 gm., menthol 0·10 gm. In

preparing, the first three ingredients are heated until completely liquefied, and then the menthol is added. Phenosalyl is very soluable in glycerin, it dissolves in water in the proportion of 4 to 100. Phenosalyl is used as a disinfectant, being able to sterilize, in aqueous solution, tuberculous expectoration anthrax cultures.

Reaction between exalgin and salicylic acid.—On triturating these two compounds in a motar, Dr. De Parel, of Dieppe, observed (*Rép. de Phar.*, July, 1892) that the mixture formed a soft paste which soon became liquid. These two chemicals should, for the reason stated, not be prescribed together in a solid form; but on replacing the salicylic acid by sodium salicylate, the difficulty is obviated.

A deodorant of iodoform.—According to Revue des inventions technique (*Monit. de Pharm.*, 1892, 1138) oil of turpentine acts as a strong deodorant for vessels to which the odor of iodoform adheres. The vessels are well covered with turpentine (a thin layer is only necessary), and in about a minute are washed with soap and water (acts very nicely.—H. C. C. M.). See also Am. Jour. Phar., 1891, p. 404.

Colored vegetation in distilled mint water.—H. Barnouvin noticed in a distilled mint water (*Rép. de Phar.*, July, 1892) an organic sediment which increased very rapidly. It consisted of groups of globular cells, having an orange-yellow color, destitute of mobility, and secreting a soluble pigment, imparting a yellow color to the water. The cells belonged to Micrococcus aurantiacus, *Cohn.*

Sodium ethylate, prepared by acting with sodium upon alcohol at 50° C., is stated to exert a favorable influence upon certain cutaneous affections. Prof. Gamberini, of Bologna, and Dr. Maroni (*Semaine médicale*) have used a two per cent. solution of this compound in olive oil as a lotion in a case of psoriasis, which completely disappeared in twenty days. Applying under a protective covering an aqueous solution of 10 per cent. sodium ethylate, very favorable results were observed in Paget's disease, erythematous lupus and in torpid ulcers of various origin.

Distinction between syrup of codeine and syrup of morphine.—Dr. Denigès (*Journ. de Méd. de Bordeaux*, Aug. 7, 1892) uses Tanret's reagent for distinguishing between the syrups of the two alkaloids. The reagent is composed of potassium iodide 3·32 gm., corrosive sublimate 1·35 gm., distilled water 80 cc., acetic acid 20 cc. With

syrup of codeine the reagent gives a precipitate, or with syrup of 0·20 gm. to the kilo of syrup an opalescence appears, while with morphine syrup, even of the strength of 1·25 gm. hydrochloride to the kilo of syrup, no opalescence appears. Iodo-potassium iodide may be substituted for Tanret's reagent and yields good results.

Presence of strychnine in the brain.—In 1882 Gay, Schlagdenhauffen and Garnier found strychnine in the brain of a subject having died from a large dose of that alkaloid. Grandval and Lajoux have recently made a like observation (*Rép. de Phar.*, July, 1892) in a case of slow poisoning, in which only 42 mgm. of strychnine could be obtained from the stomach. It appears, therefore, that strychnine will be found in the brain after large or small doses have been taken, and after death has taken place, either slowly or rapidly.

Detection of copper sulphate in iron sulphate.—According to Vandenput (*Journ. de Pharm. d'Anvers; Monit. de Pharm.*, 1892, 1107) copper cannot be detected in sulphate of iron by means of ammonia except when present in rather large proportion. When present in small quantities the ammonia does not form the blue copper solution. In the latter case the author dissolves the precipitate in nitric acid and places in the solution a bright piece of iron on which the copper when present is deposited.

Molybdate of ammonium as reagent.—F. Gigli (*Boll. chim. farm.*, xxxi, 1892, 235, through *Rép. de Pharm.*, 1892, 315) uses the following solutions for preparing the reagent for phosphoric acid extemporaneously. 15 gm. of commercial ammonium molybdate are dissolved in the minimum amount of ammonia and the solution diluted with distilled water to 100 cc. The second solution is nitric acid, sp. gr. 1·185, containing 30 per cent of HNO_3. The solutions are mixed when needed, 1 cc. of the molybdate solution being added to 2 or 3 cc. dilute nitric acid, and to this the liquid to be tested. In presence of phosphoric acid a lemon-yellow precipitate rapidly appears without the application of heat, one condition being that the testing be carried on in a slightly acid solution.

Volumetric determination of phosphoric acid.—M. Spica (*Gazz. chim. ital.*, 1892, 117, through *Rép. de Pharm.*, 1892, 316), estimates the phosphoric acid by means of ferric phosphate, which is precipitated completely in neutral solution. The reagent is a solution of

iron ammonia alum and is regulated so that 1 cc. = ·001 gm. P_2O_5 being titrated preferably with a solution of phosphate of ammonium, 2 9439 gm. to a litre. After obtaining the phosphates in solution (iron, aluminium and manganese being eliminated), it is exactly neutralized with a caustic alkali, using phenolphthalein as indicator; to this solution is added a small quantity of salicylic acid and the above reagent is used for titration. Toward the end of the operation it is best to allow the precipitate to settle, so as to observe with better advantage the end of the reaction, which is indicated by a violet coloration.

ON THE IODIDES OF SULPHUR [1]

By Prof. Herbert McLeod, F. R. S.

An iodide of sulphur, SI_6, isomorphous with iodine, was prepared by Landolt and measured crystallographically by Vom Rath (*Poggendorff's Annalen*, cx, 116). It was made by allowing a solution of iodine and sulphur in carbonic disulphide to evaporate spontaneously. As the existence of this compound has been adduced as a proof of the hexad character of sulphur, it seemed advisable to investigate its properties.

Some of the substance was prepared by the process mentioned, and in order to separate it from any admixture of iodine, it was placed in a tube which was afterwards exhausted by the Sprengel pump and sealed. One end of the tube was then surrounded by muslin kept wet with water by means of a piece of cotton wick; iodine volatilized, at first rapidly but afterwards more slowly. After the lapse of three months a residue was left at the end of the tube which, on analysis, was found to contain 98·5 per cent. of sulphur.

Another quantity was dissolved in carbon disulphide and the solution allowed to evaporate; as crystals were formed the liquid was poured off and the crystals washed with carbonic disulphide. In this manner five crops of crystals were obtained, none of which contained more than half a per cent. of sulphur; the residue left on allowing the mother-liquor to evaporate contained 56 per cent. of sulphur.

The iodine is entirely removed from the substance by digesting it in a solution of potassic iodide.

[1] Read before the British Association, Edinburgh Meeting, 1892, Section B, reprinted from *Chem. News*, Sept. 2.

When some of the powdered substance is exposed to the air in a shallow layer, the iodine all volatilizes, leaving a residue of sulphur.

When acted on by a solution of sodic hydrate, a residue of sulphur is left, and the solution gives very little precipitate with baric chloride after acidifying with hydrochloric acid.

The properties of the substance seem to indicate that it is a mechanical mixture of iodine and sulphur and not a chemical compound.

Some experiments were then made with the iodide of sulphur, S_2I_2, described by Guthrie. This was prepared by mixing chloride of sulphur, S_2Cl_2, with ethylic iodide, and allowing the mixture to remain in a sealed tube for four days. Black crystals were then found in the tube. On opening the latter a large quantity of the vapor of ethylic chloride escaped.

The crystals were removed from the tube and powdered. On heating a portion in a test-tube it fused at a temperature a little above the boiling-point of water.

Some of the substance *in vacuo* gave off iodine, leaving a light colored residue. Some of the substance dissolved in sulphide of carbon was crystallized fractionally; the first crop contained 0·38 per cent. of sulphur; the second 0·31; the third 1·07; and the fourth 34·78. On allowing the mother-liquor to evaporate, the residue contained 76·32 per cent. of sulphur.

When acted on by a solution of sodic hydrate the iodine is removed and all the sulphur remains behind, the solution giving no precipitate with baric chloride after adding hydrochloric acid. It is usually stated in text-books that the compound undergoes a decomposition similar to that of the chloride of sulphur, forming an iodide and a sulphite or thiosulphate, with separation of sulphur.

The fusing-point being lower than those of iodine and sulphur would indicate that some chemical action takes place when the elements are mixed together, but its properties more resemble those of a non-metallic alloy than of a definite chemical compound.

SEPARATION OF IODINE, BROMINE AND CHLORINE.[1]

By C. Schierholz.

When each of the three halogens is present in fair quantity, the author adopts an indirect method, in which two weighings only are

[1] *Monatsh.*, **13**, 1–39; *Jour. Chem. Soc.*, 1892, p. 1028.

necessary. Two equal volumes of the neutral solutions, in which the halogens are to be determined, are measured out, and one of them is accurately titrated with a 1/20 normal silver nitrate solution. The number of cc. required, *a*, and the weight of the silver precipitate, *b*, are accurately determined. The second portion of the solution is treated with a few grams of potassium bromide, and the same volume of the silver nitrate solution as was required to precipitate the halogens in the first portion, is added. The solution is boiled for some time, diluted with water, and the weight, *c*, of the resulting precipitate, which contains all the iodine, all the silver, and some bromine, is noted. By means of the three values, *a*, *b* and *c*, the quantity of each halogen present can be readily calculated.

If only a small quantity of iodine and bromine is present with relatively much chlorine, the method of estimation depends on the facts that silver iodide is insoluble in moderately concentrated solutions of sodium chloride, and that bromine and chlorine can be separated by distillation with solutions of potassium permanganate and aluminium sulphate. For the latter process, the author employs a distillation apparatus, consisting of a retort and condenser, and made of glass in one piece, the last portions of the bromine being expelled by boiling with a little dilute sulphuric acid. The bromine is absorbed in a flask containing dilute ammonia, whereby it is converted into ammonium bromide and probably partly into ammonium hypobromite; the whole of the bromine is, however, precipitated as silver bromide, on adding silver nitrate to the solution. This method of separating the iodine is only available when (say, in a mixture of sodium salts) it is present in the proportion of not more than 1 part of iodide to 6 or 7 of bromide and 1,000 of chloride, under which circumstances, on the addition of a little silver nitrate, only silver iodide is precipitated, since silver bromide and silver chloride are soluble in strong sodium chloride solution. If, however, more bromide, or more iodide and bromide, are present than is indicated by the above-given ratio, it is best to precipitate and estimate the iodide as palladium iodide.

In making the above separations, the author has incidentally investigated the solubility of silver chloride, bromide, and iodide in solutions of the halogen salts of the alkalies, more particularly in sodium chloride. Such solutions dissolve 4–5 times as much of the halogen salts of silver at their boiling point, as at the ordinary tem-

perature. The concentration of the solution of the halogen salts of the alkalies has also a marked effect on the solubility of the silver compounds; a 10 per cent. solution of sodium chloride and a 1 per cent. solution of potassium iodide dissolving scarcely any recognizable quantity of the corresponding silver compounds. The very great difference between chlorine and iodine is shown both in the relative solubility of silver chloride and silver iodide, and in the different solvent power of the halogen alkali salts on silver nitrate, silver chloride, etc.; bromine occupying a position between chlorine and iodine. For example, 100 grams of sodium chloride or of potassium chloride in a 20 per cent. solution dissolves hardly a trace of silver iodide, whilst 100 grams of potassium iodide in concentrated solution dissolves about 90 grams of the salt, and a boiling saturated solution dissolves 4–5 times that quantity. Mixtures of the halogen salts of the alkalies, in particular proportions, are unable to dissolve as much of the silver salt as each can before admixture.

A SIMPLE METHOD FOR DETERMINING THE WATER IN IODINE.

By Prof. Dr. Meincke.

For determining the water of crystallization in iodiferous substances readily capable of decomposition, E. Ostermeyer passes the vapors of iodine and water, by means of a current of air, through a moderately heated combustion tube filled with spirals of sheet silver or copper, and allows the watery vapors, freed from iodine, to be absorbed in weighed drying tubes. When it is merely required to determine relatively small quantities of iodine, the metal spirals do good service; but as the proportion of moisture in iodine is generally small, it is desirable to take for its determination not too small a quantity of the material. Hence the danger that the iodine may escape absorption by the spirals is increased, except they are made of an inconvenient length.

My procedure, in which this risk is not merely obviated, but the apparatus is of the utmost simplicity, is as follows:

The iodine to be examined is allowed to fall from the weighing-glass into a test-tube of about 1 cm. in width and 6 cm. in length; it is at once superstratified with from four to five times its quantity of silver powder, previously ignited; the tube is closed with a glass stopper, ground to fit its mouth, and weighed immediately; or, if

in case of a high temperature of the air, the silver is being attacked by the iodine on mutual contact, not until completely cold. The open tube, which may be set in a small beaker, is heated upon an asbestos plate, so gently that only a very slow formation of silver iodide takes place. As this reaction can always be observed, it may be easily regulated in case of need by removing the beaker from the asbestos plate. With experience, which is easily acquired, there is no risk of the escape of even traces of iodine. Should it really occur, it would be inevitably shown by a change of the color of the silver powder; the silver powder then appears attacked to its upper layer, whilst if the operation is correctly managed, the upper portions of the silver must remain unchanged. During the formation of silver iodide, the water which escapes is condensed in the colder parts of the tube, from which, after the complete absorption of the iodine, it is expelled by a higher temperature. When this takes place, the tube is stoppered up, allowed to cool, and weighed. The difference shows the quantity of water which has been present in the iodine. The determination, with all the preparations, scarcely requires one hour.

The method allows of an accurate determination of moisture in iodine, even if chlorine and bromine are simultaneously present; it loses, however, its trustworthiness if considerable quantities of cyanogen are present.—*Chemiker Zeitung; Chem. News*, Sptb. 16, 1892, p. 144.

VOLUMETRIC ESTIMATIONS AND ANALYTICAL SEPARATIONS BY MEANS OF POTASSIUM FERROCYANIDE AND FERRICYANIDE.[1]

By C. Luckow.

The use of potassium ferrocyanide is somewhat restricted, as so many ferrocyanides are insoluble. For instance, in the important titration of zinc ores it is necessary to remove iron and other metals before titrating with the ferrocyanide. The author, therefore, has made an attempt to introduce ferricyanide instead. Having prepared a potassium ferricyanide free from sulphates and chlorides, it was found that this substance may be used in acid solutions even in

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[1] *Chem. Zeit.*, **15**, 1491; *Jour. Chem. Soc.*, 1892, p. 1129.

presence of ferric oxide, and that no precipitates are formed in presence of mercuric, lead, manganous, uranic and stannic salts.

These different properties of the two double iron cyanides render it possible to estimate some metals volumetrically in presence of one another, or to estimate them gravimetrically, as most ferricyanides may be readily filtered off. Zinc, for instance, may be accurately estimated either volumetrically or gravimetrically by means of potassium ferricyanide in its acetic or nitric acid solution, even in presence of lead, which may then be titrated in the filtrate with potassium ferrocyanide. Tin may be titrated by means of potassium ferrocyanide, even in presence of arsenic and antimonic acids, after the solution has been evaporated with oxalic acid and then mixed with a little dilute sulphuric acid.

The ferricyanide solution should give no coloration with a uranium solution, and no precipitate with a lead salt. If it should do so, it must be mixed with a little chlorine-water, and the salt recrystallized.

When titrating with ferrocyanide or ferricyanide, it is not possible to add the indicator straight to the liquid under examination, but use must be made of test papers. The indicator used must show either the disappearance of the last trace of the metal or else the slightest excess of the precipitant.

The author prepares his test papers as follows: A moderately thick but dense and smooth kind of filter paper is cut into strips of 30 cm. in length and 15 cm. in width. Across the narrow part, at a distance of about 4 cm. from each other, stripes are made with the solution of the indicator, which consists of cupric acetate or ferric chloride, if ferrocyanide is used; or cobaltous or ferrous sulphate, when a ferricyanide is employed in the titration. When both are used in succession, a mixture of ferrous ammonium sulphate and ferric chloride is used.

When apparently enough of the ferrocyanide or ferricyanide solution has been added to the solution to be tested, a little drop is taken out by means of a thin pencil and put at a distance of about 5 mm. from one of the stripes, when the reaction will make its appearance if the least excess is present.

The author recommends using for the titration not more than 30 cc. of liquid containing about 0·15 gram of metal. The process may also be performed by adding an excess of the reagent and titrat-

ing this in the usual manner. But amongst the ferrocyanides there are some, like the zinc, nickel and cobalt salts, which are very difficult to filter off, although this presents no difficulty with mercury, lead and silver salts. The ferricyanides are, however, more easily filterable.

BENZOYL-PSEUDOTROPEINE (TROPACOCAINE?).

This base occurs, associated with cocaine, cocamine, cinnamyl-cocaine and other bases, in Java coca leaves, and to some extent in other coca leaves. It was first recognized by Giesel,[1] who separated the base in the form of a hydrobromide, but did not describe the method by which the separation was effected. The chief points of difference from cocaine were the melting point of 49° C., and the comparatively lesser solubility of the hydrobromide and the nitrate. The hydrochloride also differed from that of dextro-cocaine and the base was, moreover, optically inactive. Further investigation by Liebermann[2] showed that the composition of this base was not analogous to that of cocaine, and that when split up under the influence of hydrochloric acid it yielded, instead of ecgonine, a base isomeric with tropine from atropine but, having a much higher melting point than that, it was considered to be identical with the base obtained by the similar splitting up of hyoscine. The other product of the transformation being benzoic acid, the new coca base was named *benzoyl-pseudotropeine*, and Liebermann succeeded in reproducing it synthetically. At the meeting of the British Medical Association, at Nottingham, attention was directed to this base by Dr. A. P. Chadbourne, of Boston, U. S. A., who, in a paper read before the Section of Pharmacology and Therapeutics,[3] described the results of an extended investigation carried out in the Pharmacological Institute of Berlin University with the assistance of Professor Liebreich and Dr. Langgaard. He showed that in many respects the physiological action of this base differs from that of cocaine. It is a powerful local anæsthetic; but in the eye does not cause the ischæmia characteristic of cocaine, or the marked irritation and hyperæmia produced by the group of substances which Liebreich has termed anæsthetica dolorosa. It was found to be

[1] *Pharm. Zeitung*, July 4, 1891.

[2] *Berichte*, xxiv, 2336; *Amer. Jour. Phar.*, 1892, 44.

[3] *British Medical Journal*, August 20, 1892, p. 402.

only half as poisonous as cocaine; local anæsthesia was produced more rapidly than by cocaine, and apparently by less concentrated solutions. Dr. Chadbourne proposes to substitute for the name benzoyl-pseudotropeine that of "*tropacocaine*" as being more suited for medical use, and suggestive of the chemical relations of this base to atropine and cocaine. That name, however, would be chemically inappropriate because the base is not an analogue of cocaine, but is really one of the class named by Ladenburg "tropeines."

In the last number of the *Annalen*, Dr. O. Hesse has given a statement of the results obtained by him in the examination of benzoyl-pseudotropeine and the products of its decomposition. The base has the form of colorless plates of fatty lustre; it melts at 48° (Liebermann gives 49° C.), but in other respects the observations of Hesse agree with those of Liebermann. The composition of the base is represented by the formula $C_{15}H_{19}NO_2$.

The *hydrochloride*, $C_{15}H_{19}NO_2,HCl$, is very soluble in water. When crystallized from alcohol it has the form of large rhombic crystals, and when precipitated from alcoholic solution by ether the form of extended laminæ. The salt melts at 269° C. (Liebermann gives 271° C.), and it is scarcely soluble in ether. Its water solution is optically inactive.

The *platinum salt* $(C_{15}H_{19}NO_2)_2.PtCl_6H_2$, obtained by precipitation, forms small pale yellow needles sparingly soluble in water. Liebermann described the salt as amorphous.

On treating a solution of benzoyl pseudotropeine in methylic alcohol with methyl iodide, colorless crystals soon separate, which consist of *benzoyl-pseudotropeine-methyl iodide*, $C_{15}H_{19}NO_2,CH_3I$, which is tolerably soluble in hot methylic or ethylic alcohol. The corresponding *chloride*, $C_{15}H_{19}NO_2,CH_3Cl$, obtained by treatment with freshly precipitated silver chloride, crystallizes on evaporating the solution in stout prisms or needles. The *platinum salt* $(C_{15}H_{19}NO_2CH_3)_2,PtCl_6 + 2H_2O$, has the form of orange-colored needles, sparingly soluble in cold water. The *gold salt*, $(C_{15}H_{19}NO_2CH_3)_2.AuCl_4$, has the form of a yellow crystalline precipitate, sparingly soluble in cold water. When a water solution of the iodide is shaken with freshly precipitated silver oxide a strongly basic solution of the benzoyl-pseudotropeine hydroxide is obtained, and on evaporating this solution in the exsiccator an almost colorless residue is obtained, which is readily soluble in water.

Liebermann stated that by the splitting up of benzoyl-pseudotropeine with hydrochloric acid it was converted into benzoic acid and a base which he regarded as being identical with that obtained from hyoscine by Ladenburg. Hesse has, however, found that the base produced from *hyoscine* has a different composition from pseudotropeine, and it has been named by Hesse *oscine*.[1]

After separating the benzoic acid, produced by the action of hydrochloric acid upon benzoyl-pseudotropeine, and evaporating the acid solution a crystalline residue is obtained, from which the base formed by the splitting up of benzoyl-pseudotropeine can be obtained by adding caustic soda and shaking with chloroform. On evaporating the chloroform solution the *pseudotropeine* remains in the form of prisms, which gradually become moist on exposure and melt at 108°. In other respects it agreed with Liebermann's description, and as the formula of benzoyl-pseudotropeine is $C_{15}H_{19}NO_2$ the base can only have the composition represented by the formula $C_8H_{15}NO$, as Liebermann found was the case.

The *pseudotropeine hydrochloride* crystallizes, on evaporating the water solution, in the form of long needles which rapidly deliquesce. On adding to the solution platinum chloride, the platinum salt soon crystallizes out as orange-red tabular crystals readily soluble in water. On evaporating the solution the salt crystallizes in fine prisms. In both cases the crystals have a marked lustre, which they rapidly lose on warming from loss of water of crystallization. At 100° C. the salt becomes anhydrous and then it melts at 206° C. Analysis gave results agreeing with Liebermann's formula—$(C_8H_{15}NO)_2,PtCl_6H_2 + 4H_2O$.

The *gold salt* has the form of yellow laminæ, and melts at 202°. Liebermann gave 225° C.

Pseudotropeine combines readily with methyl iodide, solidifying with evolution of heat. After recrystallization from water the compound has the form of colorless rhombohedral crystals generally grouped like those of ammonium chloride. It is anhydrous and melts at 270° C. The chloride has the form of stout rhombohedral crystals, which are anhydrous, readily soluble in water, sparingly in alcohol. The platinum salt is anhydrous, melts at 216° C., and crystallizes well from hot water. Pseudotropinemethylhydroxide becomes brown on evaporating its water solution in the exsiccator. —*Phar. Jour. and Trans.*, Sept. 24, p. 241.

[1] *Pharm. Journ.*, xxii, 222.

RESEARCH ON THE ACIDS OF BUTTER.[1]

BY EMIL KOEFOED.

785 grammes of a butter fat giving 15·1 cc. Reichert figure (by Nilson's modification, *Z. für Anal. Chemie*, 28, 175), were saponified with 200 grammes caustic soda in 500 cc. of water; the soap was decomposed by 300 grammes of sulphuric acid diluted with 500 cc. of water, and the liquid boiled under an inverted condenser till the soap was all decomposed, a current of carbon dioxide being passed through the flask. The fatty acids (720 grammes) were filtered, and the aqueous filtrate shaken three times with ether, which, on distillation, left 6 grammes of acids smelling like butyric. This extraction with ether was proved to have removed the whole of the organic acids. The 6 grammes constituted Portion I.

The 720 grammes of acids left on the filter were distilled under 30 mm. pressure. The acids distilling between 93° and 200° weighed 54 grammes, and constituted Portion II.

The remaining acids were dissolved in 500 grammes of alcohol of 95° Tralles, and were several times crystallized from this medium; 100 grammes were thus obtained.

The whole of the alcoholic filtrates (about 4 litres) were, after the addition of 30 gm. of acetic acid, treated with an alcoholic solution of 600 grammes of crystallized lead acetate. The precipitate was collected after 24 hours on a filter, washed with alcohol, and air dried. The acids were then set at liberty by boiling with hydrochloric acid, and weighed 314 grammes, which, with the 100 grammes obtained by crystallization, formed Portion III.

The filtrate was made faintly alkaline with ammonia, and a small quantity of a semi-fluid lead salt separated, probably Gottlieb's oxyoleate of lead. This was boiled with hydrochloric acid, and the acid thus obtained dissolved in ammonia, and its barium salt precipitated by barium chloride. This formed Portion IV.

From the filtrate the alcohol was removed by distillation, and the fatty acids transformed into barium salts as above. These constituted Portion V.

The Portions were then examined.

Portion V. The barium salts were boiled successively with acetic ether and chloroform. From the acetic ether solution, oleate

[1] *Bulletin de l'Academie Royale Danoise*, 1891; *The Analyst*, 1892, p. 130.

of barium separated on cooling. This was recrystallized from 80 per cent. alcohol, and then gave 19·38 per cent. Ba; calculated for barium oleate, 19·59.

The chloroform solution gave, after cooling and filtering, on the addition of four volumes of ether, a white amorphous precipitate, which, on drying, became a brown, gummy amorphous mass. Upon analysis its composition was found to be Ba. $(C_{15}H_{27}O_4)_2$. The author regards this acid as $C_{15}H_{28}O_4$. It easily decomposed, as after some time its barium salt becomes insoluble in chloroform.

Portion IV. This is insoluble in ether, acetic ether and chloroform. The analysis led to the formula $C_{29}H_{54}O_5$ (dibasic)[1] for the acid.

Portion III. This portion was fractionated under 30 mm. pressure; Brühl's receiver (*Ber.*, 1888, 3339) being employed. Fractions were collected: A 200° — 230°; B 231° — 238°; C 240° — 242°; D 244° — 248°; E 251° — 255°. The two last fractions were crystallized from a small quantity of alcohol.

The fractions B — E were fractionally precipitated by quantities of 25 cc. of a normal magnesium acetate solution. The fractions were then boiled with hydrochloric acid, and the melting points of the acids taken; they were then transformed into silver salts, and the silver estimated. Fraction E_I melted at 68°; after re-fractionating the melting point rose to 69°, and the silver salt contained 27·57 per cent. Ag. (calc. for stearic acid 27·62 per cent.). E_{III} melted at 62°, and its silver salt gave 29·73 per cent. Ag. (calc. for palmitic acid 29·75 per cent.)

Fraction E was then principally palmitic acid with a small quantity of stearic acid. Arachidic acid was not detected.

Fraction D was also palmitic acid.

Fraction C (weighing 131 grammes) was dissolved in 700 grammes of alcohol, and deposited, after 24 hours, 31·5 grammes of solid acids, principally palmitic acid; the remainder was fractionally precipitated by magnesium acetate, seven fractions being obtained. *Fractions* C_{III}—C_{VII} were magnesium myristate; the acid fused at 53° and the silver salt contained 32·22 per cent. Ag. (calculated for myristic acid 32·24 per cent.).

Fraction B still contained myristic acid; B_{IV} and B_V were, however, lauric acid, for the acid melted at 43·5°, and the silver salt

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[1] Probably a mixture.

contained 35·35 per cent. Ag. (calculated for lauric acid, 35·18 per cent.).

Fraction A was neutralized with ammonia, and fractionally precipitated by 5 portions of 20 cc. of normal alcoholic silver nitrate. A_{III} — A_{V} corresponded to silver caproate.

Portion II. This was fractionated as fraction III A by means of 10 portions of silver nitrate. These were washed with alcohol, boiling water, and again alcohol, and air dried.

Fraction 4 contained a percentage of silver corresponding nearly to silver caprylate; it was, therefore, refractionated, and a series of precipitates were obtained corresponding exactly to silver caprylate.

Fractions 5—10 were chiefly silver caproate. In order to decide whether this was normal caproic acid or isobutylacetic, the author determined the solubility of the calcium salt. 100 cc. of water at 17·5 dissolved 2·58 grammes of anhydrous calcium salt. Lieben (*Ann.* 165, 118) has shown that at 18·5° 100 cc. of water dissolves 2·707 grammes of normal calcium caproate and 11·3 grammes of calcium isobutylacetate. Butter, therefore, contains normal caproic acid.

Portion I. This was principally butyric acid. The silver salt, after crystallization from water, gave 55 27 per cent. Ag. (calculated for butyric acid, 55·38 per cent.). Grünzweig (*Ann.* 162, 215) has already shown that the butyric acid in butter is normal.

The butter then examined contained 91·5 per cent. of fatty acids, of which the percentage composition is as follows:

Oleic Acid Acid of the formula $C_{15}H_{28}O_4$ " " " $C_{29}H_{54}O_5$(?)	34·0
Stearic Acid,	2·0
Palmitic Acid,	28·0
Myristic Acid,	22·0
Lauric Acid,	8·0
Capric Acid,	2·0
Caprylic Acid,	0·5
Caproic Acid,	2·0
Butyric Acid,	1·5
	100·0

Euphorbia pilulifera administered in the form of fluid extract has been found useful by Dr. E. S. Blair (*Therap. Gaz.*, March, 1892) in hay asthma, not only in the primary attack, but also in cutting short any recurrence of the affection.

LIGNITE TAR.[1]

BY F. HEUSLER.

A quantity of the lighter portions of the distillate from lignite tar was fractionated after treatment with dilute acids and alkalis. On distillation at ordinary pressures, decomposition sets in at about 180°. The oil is readily attacked in the cold by potassium permanganate in dilute sulphuric acid solution. A quantity (1,950 cc.) of the oil boiling at 148–162° was treated with potassium permanganate (167 grams) in the cold until the action was over. On steam distillation, an oil (1,208 grams) boiling at 130–165° was obtained; the largest fraction (328 grams) of this distilled at 145–150°. The lower boiling parts of the crude tar oil are acted on with explosive violence by nitric acid. After treatment with potassium permanganate, however, nitration proceeds quietly; the greater portion of the oil dissolves with evolution of gas, and on pouring the acid solution into water, a heavy oil separates which is partially soluble in soda. A considerable proportion, however, remains undissolved, and consists of nitro-derivatives of aromatic hydrocarbons.

On fractional bromination in the cold of the oil dissolved in ether, a product is obtained which may be separated by steam distillation into a light and a heavy oil. The lighter portion consists of bromo-derivatives of aromatic hydrocarbons.

Lignite tar oil is readily acted on by concentrated sulphuric acid with evolution of sulphurous anhydride. The oil (15 parts), if agitated first with a mixture of water (1 part) and concentrated sulphuric acid (2 parts) and then with a mixture (4½ parts) of water (1 part) and concentrated sulphuric acid (3 parts), yields an oil which, on steam distillation and subsequent fractionation, is found to be similar to that obtained by oxidation with permanganate and to have a strongly aromatic odor. The fraction of this oil, boiling at 80–93° was found, by nitration, to contain about 34 per cent. of benzene. The fraction boiling at 100–110° of the oil obtained by the treatment with permanganate, described above, was found by nitration to contain about 45 per cent. of toluene. Derivatives of metaxylene and mesitylene were also recognized among the products of nitration. The fraction boiling at 135–140° of the oil

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[1] *Berichte*, **25**, 1665–1678; *Jour. Chem. Soc.*, September, 1892, p. 1075.

obtained by treatment with permanganate contained about 30 per cent. of aromatic hydrocarbons.

On nitration of the oil, a certain quantity was always unattacked; this consists of naphthenes, and the proportion increases as the boiling point of the oil rises, and varies from 14·5 per cent. in the fraction boiling at 90–100° to 33·3 per cent. in the part boiling at 300°.

No evidence of the presence of terpenes in the oil could be obtained on treating the oil by Wallach's methods. Indene and cumarone, also, could not be detected. The fraction boiling at 180–240° was found by treatment with picric acid to contain 4–5 per cent. of naphthalene.

NITRATED SILK.[1]

By L. Vignon and P. Sisley.

When silk is immersed in ordinary nitric acid (sp. gr. 1·133) at 45° for one minute, and is subsequently washed in water, it is colored intensely yellow, and the color is unaffected by exposure to air and light, whilst it is deepened by the action of dilute alkali solutions. Nitric acid free from nitrous compounds does not cause this coloration, which is found to vary in intensity directly with the amount of nitrous compounds present, and with the temperature and specific gravity of the acid used. The deepening of color by alkaline solutions is independent of their causticity, whilst the silk increases in weight and takes up a certain amount of the base.

Silk treated with a mixture of hydrochloric acid and sodium nitrite is colored pale yellow; the color is rapidly browned on exposure to air and light, or by the action of boiling water or alcohol, whilst cold alkaline solutions turn it reddish-brown. Silk which has been subjected to the action of nitrous acid, or of nitric oxide, in an atmosphere of carbonic anhydride, and subsequently well washed, is colorless, but is colored a stable yellow by nitric acid. Nitric peroxide colors silk yellow at once. Silk heated with nitrous acid, and then oxidized with potassium permanganate and hydrochloric acid, is colored exactly as by nitric acid (impure), from which it seems that the yellow coloration is dependent on the action of nitrous compounds, and subsequently of an oxidizing agent.

[1] *Bull. Soc. Chim.* [3], **6**, 898; *Jour. Chem. Soc.*, September, 1892, p. 1111.

The yellow color is discharged by acidified stannous and chromous chloride solutions. Analyses of the nitrated silk show that about 2 per cent. of nitrogen is fixed in the reaction, probably, primarily, as the nitroso-group, which the further action of the nitric acid converts into the nitro-group, a carboxyl group being displaced. The properties of the product somewhat resemble Mulder's xanthoproteic acid, but this contains more carbon and less nitrogen, and results from a more intense action. Sulphuric acid dissolves ordinary silk gradually to a slightly colored solution, whereas nitrated silk is converted into a pale-yellow, viscid mass. Aqueous potash dissolves ordinary silk in the cold, and nitrated silk on heating; neither solution is precipitated by dilution with water, and both evolve ammonia when heated. Both varieties of silk are dissolved by hydrochloric acid and by zinc chloride solution.

Ammoniacal vapors are evolved on distillation of each variety, and a carbonaceous residue is left. On ignition, nitrated silk burns more rapidly than ordinary silk.

NOTES RELATING TO THE SOLANACEOUS BASES.[1]

BY DR. O. HESSE.

Solanaceous plants contain a number of bases which yield by the action of alkalies or of acids tropic acid, or derivatives of that acid, together with volatile bases, and in that respect present relations with each other. Some of these solanaceous bases are extensively used in medicine, as, for instance, atropine, while others are of interest only in their scientific relations.

Although the preparation of these bases has now acquired a high degree of perfection, as may be inferred even from the external appearance of most of the commercial articles now referred to, it now and then happens that these articles possess characters which do not quite agree with published statements. These differences, as well as Liebermann's statement[2] that the volatile base obtained by the splitting up of a coca base is identical with the pseudotropine originally prepared from hyoscine by Ladenburg,[3] induced me to undertake a further investigation of this subject, the results of which I will now describe. I have also briefly touched upon apoatropine in reference to the communication of E. Merck[4] on that base, though I have not been able to make any experimental examination of it.

(1) ATROPINE.—Under this name published statements are to be understood as indicating a base obtained principally from *Atropa Belladonna*, and melting

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[1] *Annalen der Chemie*, vol. 271, p. 100. Reprinted from *Phar. Jour. and Trans.*, September 10 and 17.

[2] *Berichte*, xxiv, p. 2339.

[3] *Annalen*, cvi, p. 299.

[4] In his *Jahresberichte*, January, 1892.

between 115° and 116°. In commerce it is termed also "heavy atropine" or "atropinverum."

For the preparation of this base I selected the commercial sulphate in a state of absolute purity. A solution of the salt in water was mixed with excess of ammonia and shaken out into chloroform. On evaporating the chloroform solution the base was obtained, partly in the form of delicate white needles and partly as brilliant prisms melting at 115°·5. A solution in absolute alcohol gave for $p = 3{\cdot}22$ and $t = 15°$ $[\alpha]_D = -0{\cdot}4$. Will stated[1] that atropine in alcoholic solution has no rotatory power; but subsequently he, together with Bredig,[2] found the rotatory power to be — 1·89. On the contrary, Ladenburg[3] is of opinion that atropine is optically inactive, though he admits that he could not obtain it in a perfectly inactive state.

Neutral Sulphate.—In ophthalmic practice atropine is not used in the free state, but as a sulphate which is required by the German Pharmacopœia to be of great purity. The samples of the salt which I examined answered all the prescribed requirements; but, with one exception, they contained some hyoscyamine salt. The presence of this salt may be readily ascertained by mixing a solution of the salt to be examined in absolute alcohol with ether until a milky turbidity is produced. After some short time the turbidity disappears, and when hyoscyamine is present the salt separates in the form of dull, crystalline masses; but in the absence of hyoscyamine salt the atropine sulphate takes the form of long, brilliant, loosely connected needles. Atropine sulphate contains water of crystallization which is easily removed at 100°. The composition of the salt is represented by the formula $(C_{17}H_{23}NO_3)_2,SO_4H_2 + H_2O$. The water solution gives for $[\alpha]_D - 8°{\cdot}8$ when $p = 2$ (anhydrous) and $t = 15°$.

The platinum salt, obtained by mixing a moderately concentrated solution with platinum chloride and evaporating the clear solution, crystallizes in tabular form, it is anhydrous and melts at 197–200°, according as it is rapidly or slowly heated.

The gold salt, obtained by precipitating the slightly warmed sulphate solution with gold chloride, separates partly as an oily mass, which soon becomes crystalline, and partly in small moss-like aggregates of laminæ, which have no lustre after drying in the air. The melting point of the crystalline salt is near 138°, while that of the first-mentioned form is generally about 3° lower.

The neutral oxalate, $(C_{17}H_{23}NO_3)_2,C_2O_4H_2$, obtained by very gradually adding to a solution of the base in acetone an ether solution of oxalic acid, separates in warty crystalline masses consisting of short anhydrous prisms. The salt is but sparingly soluble in hot alcohol, and separates on cooling the solution in granular masses; it melts at 176°.

(2) HYOSCYAMINE.—This base was prepared partly from the seed of *Hyoscyamus niger*, partly from the sulphate obtained from Trommsdorff, and also, as I was informed, prepared from *Hyoscyamus niger*. No difference between these preparations could be detected, but the following data could be determined only with the base prepared from Trommsdorff's salt, which proved to

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[1] *Berichte*, xxi, p. 1724.
[2] *Ibid*, xxi, p. 2792.
[3] *Annalen*, ccvi, p. 282, and *Berichte*, xxi, p. 3065.

be quite pure. It was prepared from the sulphate in the same way as atropine, and after evaporating the chloroform solution it remained in the form of delicate needles, melting at 108°·5. A solution in absolute alcohol gave for $[\alpha]_D$ — 20°·3 when $p = 3·22$ and $t = 15°$. Ladenburg[1] found — 14°·5, Will[2] — 21°·68. Hammerschmidt states[3] that a variation in the strength of the alcoholic solution, from 1 to 12, has no influence upon the rotary power of hyoscyamine. Analysis confirmed the formula $C_{17}H_{23}NO_3$.

The neutral sulphate $(C_{17}H_{23}NO_3)_2SO_4H_2 + 2H_2O$ as obtained from Trommsdorff on several occasions, was in the form of delicate needles, which became dull at 100°, owing to loss of water, and melted at 201°. The salt dissolves readily in water and in hot alcohol, and is precipitated from the latter solution as small concentrically grouped needles. It is insoluble in ether, but slightly soluble in hot acetone, separating in small white needles on cooling the solution. The anhydrous salt gave for $[\alpha]_D$ — 28°·6 when $p = 2$ and $t = 15$.

The platinum salt $(C_{17}H_{23}NO_3)_2PlCl_6H_2$, obtained by mixing a solution of the sulphate with platinum chloride and evaporating slowly, crystallizes in fine orange prisms; it is anhydrous and melts at 206°, as already stated by E. Schmidt.

The gold salt $C_{17}H_{23}NO_3,AuCl_4H$, obtained in a similar way, from a hot solution, forms fine brilliant laminæ, which retain their lustre in the air and melt at 159°. Will gives the melting point as 162°, while other chemists have found it to be from 158° to 160°.

The neutral oxalate $(C_{17}H_{23}NO_3)_2C_2O_4H_2$, obtained in the same way as the atropine salt, crystallizes as long stout prisms. The salt is anhydrous and melts at 176°. It dissolves in absolute alcohol rather more readily than the atropine salt, but also separates in granular masses.

(3) ATROPINUM NATURALE.—Under this name is understood, in commerce, the crystalline base obtained direct from belladonna root. The neutral sulphate made from this preparation is met with as Atropin. sulphur. purissimum, and most of the atropine sulphate of commerce consists of this article, which, according to the mode of preparation, contains sometimes the one and sometimes the other of the two previously-mentioned bases in preponderating amount.

For the purpose of comparison with the foregoing data the results obtained in the examination of four samples of the sulphate from different sources are given below. The salt is scarcely soluble in hot acetone, but readily soluble in hot absolute alcohol, from which it was thrown down, after cooling in crystalline masses consisting of minute needles. Analysis showed that its composition was the same as that of pure atropine sulphate. One sample was found to give for $[\alpha]_D$ — 22°·3 when $p = 2$ (anhydrous) and $t = 15°$. The base prepared in the way already described crystallized in delicate needles and it melted at 109°. A solution of the base in absolute alcohol gave for $[\alpha]_D$ — 16°·2 when $p = 2·472$ and $t = 15°$.

The neutral oxalate was prepared as above described, and mostly resembled

[1] *Annalen*, 206, p. 274.
[2] *Berichte*, 21, p. 1722.
[3] *Ibid.*, 21, p. 2784.

the atropine salt. It was anhydrous and had the same composition as the previously-mentioned oxalates. When the water solution of the sulphate was mixed with platinum chloride and evaporated, an anhydrous platinum salt was obtained, which melted between 200° and 204°. But the gold salt melted at 154° to 158°, according to the sample of sulphate from which it was obtained. By recrystallization the melting-point could be somewhat raised, and crystalline salt was obtained from the mother liquors by evaporation, melting at 145° and even less.

It was evident that the four samples of sulphate consisted chiefly of hyoscyamine salt, though the actual amount could not be accurately determined as gold salt. This can, however, be done by the optical method. For that purpose the amount of water is to be first ascertained; so that a definite quantity of anhydrous salt can be operated upon. Representing the quantity of atropine salt in the unit of weight by x and that of the hyoscyamine salt by y, their respective rotatory power for solutions of equal strength by a and b and the rotatory power of the sulphate examined, by c, the amount of hyoscyamine salt will then be given by the formula $y = \frac{c - a}{b - a}$ and the amount of atropine salt by $x = 1 - \frac{c - a}{b - a}$. A control experiment, with known quantities of atropine and hyoscyamine sulphates, furnished indisputable evidence of the accuracy of this method.

The data given above suffice to show this mode of determining the two bases. For the same strength, solvent, and temperature it was found that $a = 8{\cdot}8$, $b = 28{\cdot}6$, and $c = 22{\cdot}3$, *i.e.*, the rotary power of the mixed sulphate in question. Substituting these values in the formulæ, it is found that the hyoscyamine salt amounts to 0·682, and the atropine salt to 0·318. Consequently the salt consisted of 68·2 per cent. hyoscyamine sulphate and 31·8 per cent. atropine sulphate.

In a similar manner the relative amounts of atropine and hyoscyamine may be determined in the natural atropine or in other mixtures. Keeping to the above-mentioned strength of the alcoholic solution having the rotatory power $[a]_D = -16^\circ{\cdot}2$, the amount of hyoscyamine would be $= y = \frac{20{\cdot}3 - 0{\cdot}4}{6{\cdot}2 - 0{\cdot}41} =$ 0·794 and that of atropine $= x = 1 - 0{\cdot}794 = 0{\cdot}206$.

The determination of the bases is of especial importance in the examination of plants yielding them. Schutte[1] attempted this with gold chloride, on the assumption that the hyoscyamine salt would be precipitated first and then the atropine salt. On the whole that is correct; but the former salt carries with it more or less atropine salt, from which it cannot be separated without considerable loss, while, on the other hand, some hyoscyamine remains in the solution and crystallizes with the atropine salt in a warty form. Moreover, the solution will contain amorphous substances, which sometimes render the detection of atropine difficult, if not impracticable. This may have been the reason why van Itallie[2] was unable to find more than traces of atropine in extract of belladonna.

On this account I have abandoned that method in determining atropine, and

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[1] *Mittheilungen aus dem pharm.-chem. Institut der Universität Marburg*, xii, p. 596.
Chem. Centralbl., 1892, p. 390.

have adopted the plan of gradually adding an ether solution of oxalic acid to a solution of the bases in acetone, so long as the separation of crystals takes place. Under those conditions atropine oxalate separates first and afterwards hyoscyamine oxalate. From the several fractions the base is then separated as above described, and the nature of it determined by means of the melting point, and the behavior with gold chloride. By the aid of the optical method, which I was not then acquainted with, it would only be necessary to separate the mixed base from the deposited oxalate, and to ascertain the rotatory power of a known portion in alcoholic solution, in order to find whether the base consisted of atropine, hyoscyamine, or a mixture of both. In any case this method admits of a correct determination of the amount of atropine, while the gold chloride method gives a result that is much too low, as may be readily observed with "natural atropine" or its sulphate.

Whether the hyoscyamine salt in this sulphate may amount to 90 or only 10 per cent. and the atropine salt to 10 or 90 per cent., as is the case in the preparation recognized by the German Pharmacopœia, is of no importance in regard to the action of the salt, since in this respect there is no recognizable difference between the two salts. For that reason the requirement that the sulphate shall be prepared only from a base melting at $115^\circ{\cdot}5$ cannot be justified, because the base obtained, as it is furnished naturally, fulfils the same purpose, whether it consists of the one or the other or of a mixture of both.

4. HYOSCINE.—This base, alleged to be isomeric with atropine and hyoscyamine, was originally obtained by Ladenburg[1] from the so-called amorphous hyosycamine that was separated in the preparation of hyoscyamine from *Hyoscyamus niger*, and remained in the mother liquor. Subsequently Ladenburg[2] succeeded in preparing the hydrochloride, hydrobromide, and hydriodide of this base in the crystalline form, and hyoscine came into use as a medicinal agent. The preparation of hyoscine from *Hyoscyamus niger* was then undertaken by E. Merck, who had supplied Ladenburg with the material for his investigation. Up to within a recent period he supported the view that the composition of the base was represented by the formula $C_{17}H_{23}NO_3$, and he adopted the formula $C_8H_{15}NO$ given by Ladenburg as representing the composition of the pseudotropine obtained by the splitting up of hyoscine.[3] This latter formula, however, is incorrect, and with it falls also the formula of hyoscine, which, as I shall show, is to be altered to $C_{17}H_{21}NO_4$, a formula which is in agreement with the results of numerous determinations made by Ladenburg himself.

For the material employed in my investigation I am indebted to Messrs. E. Merck. It consisted of hyoscine hydrobromide, which was quite pure. It had the form of large crystals, but the crystalline form could not be recognized. On dissolving in the least possible quantity of hot water it separated in fine crystals, the form of which agreed perfectly with the statement of Fock.[4] The gold salt also presented all the characters described by Ladenburg as belonging to hyoscine aurochloride. When the identity of the base now known as hyoscine with that originally described under that name, had been

[1] *Annalen*, ccvi, 299.
[2] *Berichte*, xiv, 1870.
[3] Merck's *Jahresber.*, January, 1892.
[4] *Berichte*, xiv, p. 1872.

thus established, the further investigation was proceeded with for the purpose in view.

In preparing hyoscine, the method already described was exactly followed. On evaporating the chloroform solution, the base could not be obtained in a crystalline state; it remained, at the normal temperature, as a hard, transparent, resinous mass which melted near 55°, forming a mobile liquid. Analysis of the base dried at 90°, until the weight became constant, gave results corresponding much more closely with the formula $C_{17}H_{21}NO_4$ than with $C_{17}H_{23}NO_3$, and proving that the composition of hyoscine is properly represented by the former.

Hyoscine is rather freely soluble in water and very soluble in ether, chloroform or alcohol. An alcohol solution has a strong basic reaction, and it gives for $[\alpha]_D - 13^\circ{\cdot}7$ when $p = 2{\cdot}65$ and $t = 15^\circ$. When the solution is mixed with a very small quantity of caustic soda its rotatory power is rapidly diminished.

This base may be precipitated from water solutions of its salts by caustic soda or ammonia; but a certain degree of concentration of the solution is necessary for that purpose. It forms with several acids crystallizable salts, most of which have already been prepared and examined by Ladenburg, but their composition has been represented by inappropriate formulæ.

Hyoscine hydrochloride crystallizes, though with difficulty, when the water solution of the salt is evaporated. The solution does not give a precipitate with platinum chloride; but with gold chloride, on the contrary, even when tolerably dilute, it gives a crystalline precipitate. By cooling a hot solution of the gold salt it crystallizes in yellow needles, often grouped like those of ammonium chloride. The salt is anhydrous, and, as Ladenburg found, melts near 198° with decomposition. That melting-point is not the least altered, however many times the salt may be crystallized from water. Analysis of the salt gave results corresponding with the formula $C_{17}H_{21}NO_4,AuCl_4H$, and the majority of the results that were obtained by Ladenburg also agree with that formula; but not one of the gold determinations made by him agree with the formula $C_{17}H_{23}NO_3,AuCl_4H$.

Hyoscine hydrobromide has the form of large rhombic crystals with a vitreous lustre; it is readily soluble in water, and contains water of crystallization that is completely separated by drying in the exsiccator at the normal temperature. The water solution $p = 4$ (not effloresced), and $t = 15^\circ$ gives for $[\alpha]_D - 22^\circ{\cdot}5$. Analysis indicated that the composition of the air-dried salt is represented by the formula $C_{17}H_{21}NO_4,HBr + 3H_2O$, and that of the dehydrated salt by $C_{17}H_{21}NO_4,HBr$. Ladenburg, in order to bring the results of his analyses into agreement with the formula $C_{17}H_{23}NO_3$ for hyoscine, assumed that the salt dried in the exsiccator, or even at 100°, still retained half a molecule of water. But his own hydrogen determination, for the salt dried at 100°, is evidence against that assumption. In the air-dried salt Ladenburg felt compelled to assume the presence of three and a half molecules of water of crystallization; but the results of his analyses do not agree with the formulæ assigned by him to either the dried or the hydrated salt.

Hyoscine hydriodide is also obtainable in fine crystals; a water solution is lævorotatory. According to Ladenburg it also retains half a molecule of water when dried at 100°; but according to my observation it is, in that condition,

anhydrous. Ladenburg's own determinations agree with that view, while the other formula would require a considerably larger amount of hydrogen than was actually found by analysis.

In regard to hyoscine picrate, Ladenburg complained that his analytical results did not agree well with the formula $C_{17}H_{23}NO_3,C_6H_3(NO)_3O$; but, on the other hand, they do agree well with the formula which I consider to be the correct one.

A further confirmation of the formula $C_{17}H_{21}NO_4$ is furnished by the composition of the products resulting from the splitting up of hyoscine by an alkali or by hydrochloric acid. Ladenburg held that, by the action of baryta, there were formed tropic acid and a volatile base, having a composition represented by the formula $C_8H_{15}NO$, to which he gave the name of pseudotropine; while on another occasion, together with Roth, he found the composition of the very same substance to be represented by the formula $C_8H_{15}NO_2$, and he then gave it the name of oxytropine. But in reality the composition of this base is represented by the formula $C_8H_{15}NO_2$; and since that formula does not admit of any direct relation to tropine being recognized, I propose to give the base in question the name of oscine, which is derived from hyoscine in a manner analogous to the derivation of the name tropine from atropine.

When hyosine hydrobromide is heated for some hours with concentrated hydrochloric acid in a sealed tube, to 80° or 100°, after cooling, an oily liquid settles to the bottom, which can be separated by shaking out the liquid with ether, while the oscine remains in the acid portion. On evaporating the ether solution the oily liquid remains, and after some length of time it becomes partially crystalline. It is almost entirely dissolved by petroleum spirit, and on evaporating the solution, a partially crystallizable oil is again obtained; the oily substance is also dissolved by lime water, and after addition of hydrochloric acid, it can be again obtained unaltered by shaking out with ether. By treating this mass with hot water, an acid was separated, which could be readily recognized as being atropic acid. The oily liquid, thus purified, continued to yield to hot water fresh quantities of atropic acid, which was readily seen to be produced by the treatment with water. On cooling it solidified, but a thin crystalline film was distinctly recognizable on the surface. Analysis gave results showing that the composition of this substance closely approximated to the formula $C_{18}H_{18}O_5$. Owing to undoubted retention of atropic acid, the amount of carbon was rather too high, and the hydrogen too low.

On a former occasion I met with the same substance in the splitting up of atropamine and belladonnine, just as it was previously obtained by Merling in the splitting up of belladonnine. No doubt this substance, which has the character of an acid, is intermediate between tropic acid, which Ladenburg obtained from hyoscine, and the tropide first obtained by Kraut,[1] and to which Liebermann and Limpach[2] gave the formula $C_{18}H_{16}O_4$. The name of tropidic acid would therefore be appropriate for this substance. The continuous formation of atropic acid, by heating with water, would be represented by the equation $C_{18}H_{18}O_5 = 2C_9H_8O_2 + H_2O$, while the formation of a-isatropic acid which has been previously observed to result from prolonged heating to

[1] *Annalen*, cxlviii, p. 241.

[2] *Berichte*, xxv, p. 937.

80° or 90°, would likewise be represented by the equation $C_{18}H_{18}O_5 = C_{18}H_{16}O_4 + H_2O$.

In regard to oscine, which is the basic product of the splitting up of hyoscine, the acid solution of it was evaporated in a shallow capsule at a gentle heat, the residue dissolved in water, mixed with caustic soda, and shaken out with chloroform. On evaporating the chloroform solution, the oscine crystallized in rhombohedrons and short prisms. It was slightly hygroscopic and melted at 104°·5. Ladenburg found the melting point of the base 106°, the boiling point 240° to 242°. Merck found it 241° to 243°. However, oscine vaporizes when long heated to 100° in contact with air. Analysis of this base, dried for a long time at 60° in the exsiccator, gave results showing that its composition is represented by the formula $C_8H_{13}NO_2$.

Oscine dissolves readily in water, forming a strongly basic solution. It is not precipitated from its salts by ammonia, but it is separated by caustic soda as an oily liquid. With hydrochloric acid it forms a crystallizable salt. When the salt is mixed with a concentrated water solution of platinum chloride fine orange-red, apparently rhombic, prisms are formed, which can be readily recrystallized from boiling water. By evaporating the solution remaining more of the salt can be obtained. The salt contains water of crystallization, which is completely separated at 110°. The anhydrous salt then melts at 200° to 202° with decomposition. According to Merck it does not melt below 211° to 213°. Analysis gave results showing that the composition of the air-dry salt is represented by the formula $(C_8H_{13}NO_2)_2,PtCl_6H_2 + H_2O$, and that of the anhydrous salt by the formula $(C_8H_{13}NO_2)_2,PtCl_6H_2$, with which the analytical results, obtained by Merck, are in agreement. Further, the results obtained by Ladenburg and Roth[1] for the "oxytropine" salt and by Merling[2] for the same platinum salt, are also in accordance with these formulæ. Merling gives 4·9 and 4·96 per cent. for the amount of water, instead of 2·43 per cent.; but, probably, the salt analyzed was still moist, as he states that the crystals "effloresced on exposure to the air," though this cannot be observed with the carefully dried salt. It is, on the other hand, to me unaccountable that Ladenburg should have obtained for this salt analytical results corresponding closely with the formula $(C_8H_{15}NO)_2,PtCl_6H_2$.

For the corresponding oscine gold salt, the formula would be $C_8H_{13}NO_2,AuCl_4H$, but I have not analyzed it. I have, however, investigated the behavior of oscine with methyl iodide, statements regarding which have also been made by Ladenburg.

When oscine is brought together with methyl iodide, combination at once takes place with evolution of heat. It is advantageous to use a solution in methyl alcohol and to have a slight excess of methyl iodide. On evaporating the solution, after a short time, and recrystallizing the residue from water, the iodide is obtained in colorless rhombohedral crystals, which are anhydrous and readily soluble in water. Its composition is therefore represented by the formula $C_8H_{13}NO_2,CH_3I$, which agrees with the iodine determinations made by Ladenburg and Roth.[3] They adopted the formula $C_8H_{15}NO,CH_3I$, errone-

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[1] *Berichte*, vii, p. 153.
[2] *Ibid.*, xvii, p. 384.
[3] *Ibid.*, xvii, p. 151.

ously calculating for that formula 42·19 per cent. iodine, though it really requires 44·87 per cent.

The chloride, obtained by agitating a water solution of the iodide with freshly precipitated silver chloride, remains, on evaporating the solution, as a white mass, consisting of prismatic crystals which are very readily soluble in water. By adding platinum chloride to the solution, the platinochloride is obtained as fine orange-colored, quadrangular, lustrous laminæ, which are anhydrous and melt near 228°. Ladenburg and Roth state that they obtained for this salt analytical results corresponding with the formula they have adopted; but I obtained results showing its formula to be $(C_8H_{13}NO_2,CH_3)_2,PtCl_6$.

BENZOYLOSCINE.—It was of interest to ascertain whether oscine contains, like tropine, a hydroxyl group, or whether the second atom of oxygen must be regarded as otherwise combined. For that purpose a mixture of the base with an equal weight of water and a considerable excess of benzoic anhydride, was heated to 80° or 100°. After the end of the reaction the remaining anhydride was decomposed with water, and the benzoic acid shaken out with ether. From the residual solution the base was separated by means of ammonia and chloroform. The chloroform solution gave on evaporation a colorless residue, which rapidly crystallized in the form of delicate needles melting at 59°. Analysis showed that the formula of the base, thus obtained, is $C_{15}H_{17}NO_4$, and that it corresponds to hyoscine or atropyloscine.

Benzoyloscine dissolves readily in chloroform, ether, or alcohol, and the alcoholic solution has a basic reaction. It is also moderately soluble in water, very readily in acids; it is precipitated from such solutions by caustic soda, and when they are not too dilute, by ammonia, in the form of an oily liquid which soon becomes crystalline.

A warm solution of benzoyloscine in dilute hydrochloric acid becomes turbid on addition of gold chloride, and the gold salt is soon deposited in the form of small, yellow, brilliant needles. After drying at 100° the salt melts at 184°. Analysis indicates its composition as $C_{15}H_{17}NO_4,AuCl_4H$.

[*To be continued.*]

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, October 18, 1892.

The first of the present series of pharmaceutical meetings was held this day. On motion of Professor Trimble Wm. B. Webb, Ph.M., was called to preside.

The reading of the minutes of the last meeting was dispensed with.

Dr. C. B. Lowe introduced Mr. Joseph R. Wilson, who exhibited and explained the *Shaw gas tester and Inspector's instrument*, manufactured in this city. It consists essentially of an air pump which thoroughly mixes gases of any kind and in any desired proportion. In testing gases they are transferred to a cylinder, and those which are dangerous owing to their explosive properties, on coming in contact with a flame explode and by forcing a loosely fitting piston against a gong give audible notice that the mixture is such as to be dangerous to those exposed to it. The instrument is claimed to be so delicate that the presence of $\frac{1}{1000}$ part of explosive gases can be detected, and the percentage of fire damp and choke damp may be accurately determined.

The uses which the instrument may be applied to are very many, but primarily its greatest value is that of detecting the character and consequently the safety of the atmosphere in coal mines and subterraneous diggings, where gases are liable to accumulate. For testing the character of the atmosphere in school-rooms, assembly halls and churches, its use is apparent and very valuable. It has also been used in testing the character of the air in oil tanks and in the coal bunks of ocean steamers, the accumulation of gas to an explosive point in such places being of most serious importance.

Mr. Wilson also described the effects of several gases upon animal life, and stated that sulphuretted hydrogen has been found the most noxious of any experimented with. It was further stated that the School Board in New York City employed the apparatus in testing the air of the school-rooms; that the Consolidated Gas Companies of New York City had adopted it in the analysis of gas they prepare for illuminating purposes, and that ere long it would probably form part of the outfit of those chemists who make gas analysis a special part of their work.

Mr. Webb said that the exhibition and explanation of the uses of the instrument were so interesting and instructive that the thanks of the College were due to Mr. Wilson, and on motion a vote of thanks was unanimously tendered to him.

Prof. Remington said that it was remarkable what a toleration of various gases is soon established by those working among them; that sulphurous acid gas, which is so irritating, soon becomes tolerable to some extent, and that workmen who prepare water of ammonia, and are consequently exposed to the vapor of ammonia, soon cease to be annoyed by it.

Professor Maisch exhibited a collection of *photographs* prepared by Fred. D. Maisch, photographer at Chicago. Among them were some landscape views with various interesting plants, like Victoria regia, species of nymphæa, yucca, musa, etc., and a large number of handsomely executed *microphotographs* of sections of authentic drugs, among them the barks of different species of cinchona and so-called false cinchonas; the roots of senega, taraxacum, inula, apocynum, stillingia, cimicifuga, salep, colchicum, jalap and glycyrrhiza; the wood of quassia and picræna; the fruit of anise, conium, parsley, caraway, fennel and juniper; the seed of stramonium and cardamom, and many others. These photographs are very instructive for the study of the characteristic structure of drugs.

Prof. Maisch read a note from Mr. C. E. Hires in regard to the asserted parasitic character of the *vanilla plant;* also abstracts from the works of several English, French and German botanists clearly proving the plant to be epiphytic, but not parasitic. (See p. 554.)

Dr. Lowe exhibited an *apparatus for preparing syrup* for pharmaceutic uses and especially useful where large quantities of syrup are consumed at the soda-water fountain. It consists of a can with a false bottom of tinned wire supported above the middle of the can; upon this is placed a layer of cotton cloth; a small pipe is soldered to one side of the can to permit the passage of air from below the diaphragm to the upper part of the can; the sugar is put upon the strainer, water is added and the syrup percolates to the lower part of the vessel; it has proved to be of great utility during the past year that it has been in use.

Professor Remington called the attention of the meeting to a process for preparing *soap liniment* extemporaneously; he stated that the process of the pharmacopœia as frequently carried out does not yield satisfactory results; this is not because the formula is at fault, but because the method of procedure does not carry out the directions. Soap shavings recently prepared contain from 16 to 25 per cent. of moisture; but if in place thereof dried soap be used without making allowance for this water, the liniment will contain more soap than is intended by the pharmacopœial formula; hence, a portion of this excess is separated in cool weather. The formula offered was suggested by Mr. Geo. W. Sloan, of Indianapolis; it is as follows: Dissolve 2·5 parts of oil of rosemary in 187·5 parts of alcohol; then 11·2 parts of camphor is to be added and shaken till dissolved; into the mixture pour 17·5 parts of *powdered* soap and shake all together; then add water sufficient to make 250 parts. All soaps contain some trifling amount of impurity that is insoluble; after standing twelve hours the tincture should be filtered and it will remain permanent for an indefinite length of time.

Mr. Beringer read a paper upon *Ehrlich's test for typhoid urine;* he showed by a number of experiments that certain chemical compounds gave similar reactions.

Prof. Maisch said that in view of these results, great caution was necessary to avoid hasty conclusions, and that the paper was, therefore, a very valuable contribution. The papers were, on motion, referred to the publication committee.

A question was raised about the advisability of changing the hour for meeting, and upon discussion it was concluded that this had better be left to the judgment of the committee. There being no further business, a motion to adjourn was made and carried.

T. S. WIEGAND, *Registrar.*

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Gallerie hervorragender Therapeutiker und Pharmakognosten.—Galerie d'éminents thérapeutistes et pharmacognostes. Par B. Reber, pharmacien, Genève.

Gallery of prominent therapeutists and pharmacognosts.

Under the title given above in German and French, there is being published a biographical work, containing in addition also handsomely executed phototypes of men who have attained prominence in the sciences of therapeutics and pharmacognosy. Mr. Reber, the author and publisher of the work, is a pharmacist in Geneva, Switzerland, and well known as a writer on pharmaceutical subjects, and as editor of the periodical "Fortschritt; Le Progrès," which was published in Geneva in the German and French languages. A few of the biographies contained in the parts now before us appeared previously in the periodical named. The work is issued in parts containing five portraits and the necessary text in quarto. The three numbers thus far issued contain the biographies with pictures of the following scientists: Daniel Hanbury, F. A. Flückiger (now of Bern), H. H. J. Hager (Frankfurt a. d. O.), A. E. Vogl (Vienna), Geo. Dragendorff (Dorpat), E. Heckel (Marseille), F. Schlag-

denhauffen (Nancy), J. Trapp (St. Petersburg), C. Binz (Bonn), R. Bentley (London), E. Schaer (now at Strassburg), W. O. A. Tschirch (Bern), Arthur Meyer (Marburg), T. F. Hanausek (Vienna), and J. Attfield (London). As will be observed all these scientists are living, with the exception of Hanbury, whose biography, in connection with that of Flückiger, has been very appropriately selected by the publisher for the opening pages of this "gallery." The work contains much information, otherwise not attainable, or only with much difficulty; it is written in a plain matter-of-fact manner, but pays deserved tribute to such men like Hanbury, and as a collection of biographical information ranks as a very valuable contribution to the history of progress in medicine and pharmacy during the present century. As such it deserves a place in every comprehensive medical and pharmaceutical library, the more so since the publishing price is extremely low, being only 2.50 francs per number.

Sur deux Plantes alimentaires coloniales peu connues. Par MM. Édouard Heckel et Fr. Schlagdenhauffen. 8vo. Pp. 27.

Résistance des Animaux à l'action de certains poisons. Par M. le Dr. E. Heckel. Pp. 4.

Two reprints from "Revue des Sciences naturelles appliquées," of which the former treats of the natural history, chemical composition and physiological action of two little known alimentary plants, more particularly about the tubers of *Dioscorea bulbifera*, Linné, and *Tacca pinnatifida*, Forster. It is of particular interest to note the fact that the aërial axillary tubers of the first-named plant contain a toxic principle, which is not present in its subterraneous tuber. The second pamphlet is a brief report on the resistance of animals to certain poisons, especially atropine.

Modern Materia Medica for Pharmacists, Medical Men and Students. By H. Helbing, F.C.S. Third enlarged edition. New York. Lehn & Fink. London: The British and Colonial Druggist. 1892. 8vo. Pp. 202.

A year ago we commented on the second edition of this work, which had then made its appearance. That a new edition has become necessary in so short a time is of itself proof that the work has been found useful. In examining its pages we find that new chapters have been introduced, among others, on bromol, europhene, gallacetophenon, pental, salicylamide, dithiosalicylic acid, sulphaminol and thiol; and that a much larger number of claimants for medical recognition have been added under other headings, as derivatives, or allied compounds. The appendix, which contains mostly proximate principles, and their compounds, has likewise been enlarged; the divisions on the medicinal uses have been rewritten to a considerable extent, and the chemical researches, up to the time of publication, have been incorporated. It is a comprehensive, well arranged little volume, suitable for ready reference, and for reliable information on mostly "new" and "synthetical" remedies, and as such will be found very useful to the physician and pharmacist. The very complete index, containing also the synonyms of the compounds, will be appreciated by those consulting the book.

A Text-book of Chemistry; intended for the use of Pharmaceutical and Medical Students. By Samuel P. Sadtler, Ph.D., F.C.S., and Henry Trimble,

Ph.M., Professors in the Philadelphia College of Pharmacy. Parts I and II. Elementary Physics and Chemistry of the Non-Metals. Philadelphia: P. Blakiston, Son & Co., 1892. 8vo. Pp. 209.

This is a preliminary issue, not intended for general circulation, but rather for the uses of the present classes of the College, in which both authors have been active as teachers for a series of years. Part I treats of elementary physics in chapters devoted to matter, force and motion, special properties of matter (such as attraction, repulsion, pressure), heat, light, magnetism and electricity. In Part II the non-metallic elements are considered in six chapters, comprising hydrogen, the halogens (chlorine, bromine, iodine and fluorine), the oxygen group (oxygen, sulphur, selenium and tellurium), the nitrogen group (nitrogen and phosphorus), boron, and the carbon group (silicon and carbon). The definitions, descriptions of apparatus and experiments or processes, explanations of properties and applications, etc., are simple and clear, whether merely outlined or given more in detail. While nothing is omitted that may serve to illustrate the important principles and theories of chemical science, due prominence, without unnecessary prolixity, is given to such facts which have a bearing upon application in medicine and pharmacy. More than fifty well-executed cuts serve to still further elucidate apparatus, experiments and technical processes.

The work now before us is to form part of a full text-book and reference book on chemistry for students in pharmacy and medicine, and the authors will at an early date complete the entire work, which beside the above, will include the chemistry of the metals and metallic salt, the chemistry of the carbon compounds (organic chemistry), and the outlines of analytical chemistry, including the subject of drug-assaying. If continued, as will doubtless be the case, in the same excellent manner as the parts now before us, the work will form a very comprehensive, practical and valuable book for students, as well as for reference by others interested in medical and pharmaceutical chemistry.

1,500 Prescriptions of all kinds, right and wrong, selected from prescription files, journals, formularies, pharmacopœias and medical works, illustrating correct and incorrect construction, latinity, abbreviations, doses and pharmacy, and covering all the principal forms in which medicines are commonly administered. Intended as an aid to pharmaceutical teachers, students and examiners. By Oscar Oldberg, Ph.D., Professor of Pharmacy, Northwestern University. Published by the Apothecaries' Company, Chicago. 1892. Pp. 244. Price, $1.50; interleaved $2.00.

The title page explains the aim and scope of the work, which is divided into eleven parts, of which one contains prescriptions in unabridged Latin, intended to be translated into English, and to be rewritten in the customary abbreviated form. The second part illustrates problems of prescription writing; and the third and fourth parts contain prescriptions in which the quantities are to be calculated into metric terms or into the old-fashioned apothecaries' weights and measures. The remaining parts give prescriptions, of which a large number are subject to criticism for various reasons, while others present difficulties to be overcome. The prescriptions are of so varied a nature that nearly all phases, good and bad, are encountered, and furnish excellent material for comprehensive study and manipulation, leaving nothing to be desired for exercises in the direction indicated; the chirography of some prescribers

—which leads to studies of a different nature—cannot be reproduced by ordinary types.

Diseases of the Lungs, Heart and Kidneys. By N. S. Davis, Jr., A.M., M.D., Professor of Principles and Practice of Medicine, Chicago Medical College, etc. Philadelphia: The F. A. Davis Company. 1892. 12mo. Pp. 359. Extra cloth, $1.25.

This neat volume constitutes No. 14 in the Physicians' and Students' ready-reference series, and has been elaborated by the author from his notes on lectures delivered by him in the Chicago Medical College. The diseases of the organs named are grouped together as follows: Section I, Diseases of the bronchi, of the lungs and of the pleura; Sect. II, diseases of the pericardium, of the heart muscle, of the endocardium and of cardiac innervation; Sect. III, functional inactivity of the kidneys, diseases of renal circulation, renal inflammations, renal degeneration and disorders of the renal pelvis. The nature, causes, symptoms, anatomical changes and manner of treatment are concisely, and at the same time clearly and fully set forth, and particular attention has been given to the treatment, for which explicit directions are given in regard to the drugs, serviceable at particular stages of the disease, and their mode of action. The book appears to be thoroughly practical, and, therefore, eminently useful for both physicians and students of medicine.

Recherches sur le développement du fruit et l'origine de la pulpe de la Casse et du Tamarin. Par Gustave C. E. Tremeau. Lons-le Saunier. 1892. 4°. Pp. 31.

Researches on the development of the fruit and the origin of the pulp of cassia fistula and of tamarind.

A thesis from the Paris School of Pharmacy, containing, in addition to the text, nine large plates of drawings under the microscope illustrating the author's observations.

OBITUARY.

Carl Schorlemmer, LL.D., F. R. S., Professor of Chemistry to Owens College, Victoria University, Manchester, England, died there June 27, 1892. He was born in Darmstadt, September 30, 1834, in which city he was educated, studying subsequently in Giessen. In 1858 he was chosen by Professor Roscoe, of Owens College, as his assistant, and a few years later he became a professor in the same institution, a position which he held until the time of his death. In 1862 his famous investigations on the hydrocarbons of the formula C_nH_{2n+2} in the light oils of cannel coal tar were published, which were followed by others on boghead coal, petroleum, etc., and paved the way for the sound foundation upon which organic chemistry has since been laid. Schorlemmer's name is widely known as the author of text-books on the chemistry of the carbon compounds, and as the co-author, with Roscoe, of their great "Treatise on Chemistry," published simultaneously in England and in Germany. For some time before his death he had been engaged upon a history of chemistry, which, Professor Roscoe states, extends to the end of the eighteenth century, and though not completed, its speedy publication is looked to with great interest.